Iberus

Suplemento 6

REVISTA DE LA SOCIEDAD ESPAÑOLA DE MALACOLOGÍA



Vigo, noviembre 2014

Iberus

Revista de la

SOCIEDAD ESPAÑOLA DE MALACOLOGÍA

PORTADA DE *Iberus*

Iberus gualtieranus (Linnaeus, 1758), una especie emblemática de la península Ibérica, que da nombre a la revista. Dibujo realizado por José Luis González Rebollar "Toza".

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Suplemento 6 **Noviembre 2014**

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La familia Tornidae en el Suroeste del Pacífico Tropical: el género *Anticlimax* Pilsbry & McGinty, 1946 (Gastropoda, Truncatelloidea) con la descripción de 42 especies nuevas

Federico RUBIO* & Emilio ROLÁN**

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RESUMEN

Se estudian las especies de la familia Tornidae, género *Anticlimax* Pilsbry y McGinty, 1946, del suroeste del Pacífico tropical, recolectadas durante las expediciones Tropical Deep-Sea Benthos, dirigidas por IRD y MNHN, en Nueva Caledonia, Vanuatu, Fiyi, las Islas Salomón, Filipinas y Papua-Nueva Guinea. En total han sido estudiadas 44 especies, tanto de aguas superficiales como profundas, resultando 42 nuevas para la ciencia. Cada una de las especies se ilustra mediante fotografías al microscopio electrónico de barrido, discutiendo su variabilidad específica, cuando esto es posible, aportando datos sobre el hábitat, distribución geográfica y rango batimétrico. Se aportan por vez primera datos de la rádula y del opérculo en el género, relativos a la especie *Anticlimax maranii* y datos anatómicos relativos a la especie *Anticlimax* cf. *cyclist*. Se comentan otras especies relacionadas o próximas a este género. El género *Canimarina* Aguayo y Borro, 1946 y el género *Lioprora* Laseron, 1958 son considerados sinónimos de *Anticlimax*. Las especies *Cyclostremiscus (Canimarina) crassilabris* Aguayo y Borro, 1946, *Anticlimax glabra* Rubio, Rolán y Pelorce, 2011 y *Lioprora rostrata* (Hedley, 1900), situadas previamente en el género *Canimarina*, son transferidas en el presente trabajo al género *Anticlimax*. Se ilustran por vez primera *Discopsis niasensis* Thiele, 1925 y *Discopsis padangensis* Thile, 1925, se aportan nuevos datos taxonómicos y se transfieren junto con *Adeorbis carinatus* A. Adams, 1863 al género *Anticlimax*.

ABSTRACT

This paper reports on the Tornidae of genus *Anticlimax* Pilsbry & McGinty, 1946 from the tropical Southwest Pacific, collected during the Tropical Deep-Sea Benthos expeditions conducted by IRD and MNHN in New Caledonia, Vanuatu, Fiji, the Solomon Islands, the Philippines and Papua New Guinea. Forty four species, from shallow to deep water, have been studied, with forty two being new for science. Each species is illustrated by scanning electron microscope photographs, discussing its specific variability when this is possible, and providing information about its habitat, geographical distribution and bathymetric range. Data regarding the radula and operculum are presented for the first time for the genus, regarding the species *Anticlimax maranii*, and so are anatomical data regarding

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Anticlimax cf. *cyclist*. Other species similar or related to this genus are studied. The genera *Canimarina* Aguayo & Borro, 1946 and *Lioprora* Laseron, 1958 are considered to be synonyms of *Anticlimax*. *Cyclostremiscus (Canimarina) crassilabris* Aguayo & Borro, 1946, *Anticlimax glabra* Rubio, Rolán & Pelorce, 2011 and *Lioprora rostrata* (Hedley, 1900), previously placed in genus *Canimarina*, are here transferred to genus *Anticlimax*. *Discopsis niasensis* Thiele, 1925 and *Discopsis padangensis* Thiele, 1925 are illustrated for the first time, new taxonomic data are reported and, together with *Adeorbis carinatus* A. Adams, 1863 they are transferred to genus *Anticlimax*.

INTRODUCTION

The family Tornidae Sacco, 1896 comprises a very heterogeneous group of molluscs resulting from the fusion by synonymy of tornids and vitrinellids proposed by BOUCHET & ROCROI (2005). Species of tornids and vitrinellids are very similar in soft anatomy and radula as was shown in ROLAN & RUBIO (2002) in their report on the Tornidae of the east Atlantic.

VAUGHT (1989) placed the genus *Anticlimax* in Vitrinellidae. CRISCIONE & PONDER (2013) placed Tornidae in Truncatelloidea; after a phylogenetic analysis of 43 species representing 14 of the 23 families previously included in Rissooidea, and of all the families of Cingulopsoidea, reached the conclusion that Tornidae, represented by two genera (*Circulus* and *Pseudoliotia*), is monophyletic, with *Nozeba* (family Iravadiidae) being sister group to the Tornidae.

The operculum is one the characters which can be employed for distinguishing tornids from vitrinellids (BIELER & MIKKELSEN, 1988). RUBIO & ROLÁN (2011) mention in the remarks on the taxonomic position of the genus *Discopsis*, that the operculum of the African species of Torninae, when it could be observed, is oval and paucispiral, with a subcentral nucleus [*Tornus subcarinatus* (Montagu, 1803), *Tornus leloupi* Adams & Knudsen. 1969, *Discopsis apertus* Rolán & Rubio, 2002 and *Ponderinella skeneoides* Rolán & Rubio, 2002]. Conversely, the known Atlantic species of Circulinae, Teinostomatinae and Vitrinellinae have a circular operculum, multispiral and with a central nucleus [*Circulus striatus* (Philippi, 1836), *Teinostoma cocolitoris* Pilsbry & McGinty, 1945, *Cyclostremiscus calameli* (Jousseaume, 1872), *Cochliolepis parasitica* Stimpson, 1858].

According to BOUCHET & ROCROI (2005), the family Tornidae comprises four subfamilies: Torninae Sacco, 1896; Circulinae Fretter & Graham, 1962; Teinostomatinae Cossmann, 1917; and Vitrinellinae Bush, 1897. In the subfamily Torninae are included the genera previously placed in synonymy of *Tornus*, the subfamily Circulinae only includes the genus *Circulus*, the Teinostomatinae only the genus *Teinostoma*, and the Vitrinellinae groups together the other genera formerly included in the family Vitrinellidae Bush, 1897, here considered a subfamily. This classification will be employed in the present work.

The genus *Anticlimax* Pilsbry & McGinty, 1946 is formed by very small species which have a characteristic shape, which is very variable in general structure and microsculpture.

RUBIO, FERNANDEZ-GARCÉS & ROLÁN (2011) studied 101 species of the family Tornidae in the Caribbean and neighbouring areas, of which 8 are in genus *Anticlimax* and one was a new species.

The genus exists in the West Atlantic, where the mentioned 8 Recent species are known, and in the Pacific Ocean, where only 4 species were found in the literature and 2 more were placed in other genera.

Previously to the present work the 6 species known from the Indian and Pacific Oceans were collected, 2 in the West coast of America, another 2 in Sumatra, 1 in Japan and 1 in Australia.

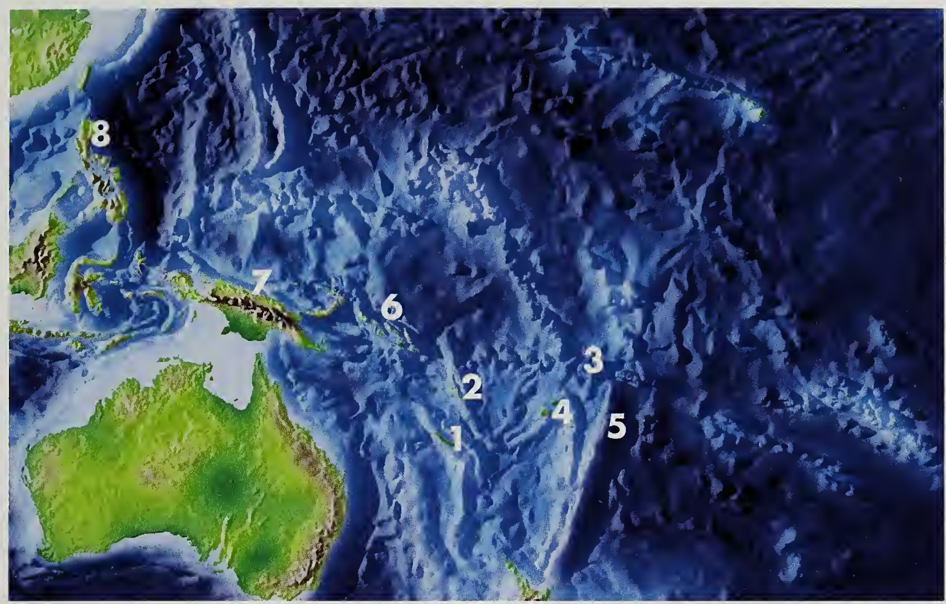


Figure 1. Location of cruises in the Tropical Deep-Sea Benthos programme and satellite cruises. 1, New Caledonia; 2, Vanuatu; 3, Wallis and Futuna; 4, Fiji; 5, Tonga; 6, Solomon Islands; 7, Papua-New Guinea; 8, Philippines.

Figura. 1. Situación de las expediciones del programa Tropical Deep-Sea Benthos y afines. 1, Nueva Caledonia; 2, Vanuatu; 3, Wallis y Futuna; 4, Fiyi; 5, Tonga; 6, Islas Solomón; 7, Papua-Nueva Guinea; 8, Filipinas.

MATERIALS AND METHODS

In the present work, we studied the species of tornids of the genus *Anticlimax* Pilsbry & McGinty, 1946 from different oceanographic campaigns carried out by the Muséum National d'Histoire Naturelle (hereafter MNHN) in the Tropical South Pacific (referred in BOUCHET, HEROS, LOZOUET & MAESTRATI 2008). These are detailed as follows:

- MONTROUZIER (1993), a land-based expedition carried out on the sites of Touho (East coast of New Caledonia) and Koumac (West coast), named in honour of R.P. Montrouzier, a pioneer in the description of the New Caledonian micromolluscs.

- BATHUS 1-4 (1993-94) on board R/V *Alis* around New Caledonia proper, and on the Norfolk and Loyalty Ridges.

- MUSORSTOM 8 (1994) on board R/V *Alis*, in the Vanuatu Archipelago.

- MUSORSTOM 10 cruise (1998) on board R/V *Alis* in the Fijian Archipelago.

- LIFOU (2000) (Biodiversity Workshop), a land-based research campaign at Lifou (Loyalty Islands Province).

- SALOMON 1 (2001) on board R/V Alis in the central part of the Solomon Islands, from Guadalcanal to Malaita and Makira.

- PANGLAO (2004) (Panglao Marine Biodiversity Project), a land-based expedition the Central Philippines: Panglao, Dauis, Cortes, Tagbilaran and Baclayon.

- PANGLAO (2005) on board MV DA-BFAR explored and researched the deep-sea fauna of the Bohol and Sulu Seas.

- SANTO (2006) (Global Biodiversity Survey) a land-based expedition in the waters of Espiritu Santo Island in Vanuatu.

- AURORA (2007) also on board MV DA-BFAR explored the northeastern Philippines.

- PAPUA NIUGINI (2012), a land-based expedition in the waters of Madang, Papua New Guinea and on board R/V Alis.

Materials used in this study were obtained by the above mentioned oceanographic expeditions in shallow and deep water of New Caledonia, Vanuatu, Fiji, the Solomon and the Philippine Islands. A map of the sampled area is presented in Figure 1.

For most of the *Tropical Deep-Sea Benthos* cruises, station numbers are preceded by a two-letter prefix that refers to the type of gear used: CC, chalut à crevettes (shrimp trawl); CH, chalut commercial (otter trawl); CP, chalut à perche (beam trawl); DR, drague à roche (rock dredge); DW, drague Warén (Warén dredge). Since 1985, all stations in the main MUSORSTOM cruise series are numbered consecutively (now over 3,000), but many satellite expeditions have used their own numbering system starting with 1.

On a steep slope, depth intervals for a single haul can span several hundred meters. As a consequence, when summarizing the bathymetric range of a species, we take the inner values of the deepest and shallowest stations, as there is no evidence that the species occurs beyond these values. For instance, if a species has been collected at 4 stations e.g. 582-594 m, 693-811 m, 749-799 m, 283-405 m, and 350-800 m, the combined confirmed bathymetric range is 405-749 m, the depths between which the species definitively occurred, not 283-811 m.

Illustrations for all the studied species were prepared using a Scanning Electron Microscope (SEM) Quanta 200. Measurements of the teleoconch, the maximum height (H) and maximum diameter (D) are based on the scale bar of the SEM micrographs. The protoconch was measured by the VERDUIN (1976) method in which a nucleus is considered at the beginning of the spire.

Abbreviations:

AMNH American Museum of Natural History, New York
AM Australian Museum, Sidney
CACTI Centro de Apoyo Científico y Tecnológico a la Investigación, University of Vigo
MNHN Muséum national d'Histoire naturelle, Paris
ZMB Zoologisches Museum, Berlin
D maximum diameter of the shell, measured perpendicular to the axis of coiling
H total height of the shell
Stn. station
spm(s) specimen(s). Because most *Anticlimax* shells are not transparent and animals can retract deep inside, it is difficult to ascertain whether there are soft parts, and no distinction has been attempted between live-taken specimens and empty shells.
s clearly empty shells
juv juvenile
fragm fragment

SYSTEMATIC PART

Superfamily TRUNCATELLOIDEA Gray, 1840
Family TORNIDAE Sacco, 1896
Subfamily VITRINELLINAE Bush, 1897

Genus *Anticlimax* Pilsbry & McGinty, 1946

Climacia Dall, 1903. *Trans. Wag. Free Inst. Sci.* 3: 1610 and 1633; pl. LX, figs. 1-3. (Preoccupied: junior homonym of *Climacia* M'Lachlan, 1869 [Neuroptera]; *Climacina* and *Anticlimax* are replacement names). Type species: *Teinostoma calliglyptum* Dall, 1903 (fossil) (Fig. 2).

Climacina Aguayo & Borro, 1946. *Rev. Soc. Malac. "Carlos de la Torre"*, 4 (1): 11 (Invalid: junior homonym of *Climacina* Gemmellaro, 1878 [Gastropoda]).

Anticlimax Pilsbry & McGinty, 1946 (July). *Nautilus* 60: 12 (replacement name). (Comment: "Neither the group *Climacia* or its type species was described by Dall, both being defined only by figures, and the size, "diam. 3.0 mm").

Canimarina Aguayo & Borro, 1946 (August). *Rev. Soc. Malac. "Carlos de la Torre"*, 4(2): 46-47. (junior synonym). Type species: *Cyclostremiscus (Canimarina) crassilabris* Aguayo & Borro, 1946 (by original designation).
Lioprora Laseron, 1958. *Rec. Austr. Mus.*, 24(11): 169 (junior synonym). Type species: *Lioprora rostrata* (Hedley, 1900) (by monotypy).

Remarks: PILSBRY & MCGINTY (1946) introduced the replacement name *Anticlimax*, for the monotypic genus containing *Teinostoma (Climacia) calliglyptum* Dall, 1903, since the genera *Climacia* Dall, 1903 and *Climacina* Aguayo & Borro, 1946, based on the same type species, were invalid because of homonymy.

Almost at the same time, AGUAYO & BORRO (1946) described *Canimarina* and placed it provisionally as a subgenus of *Cyclostremiscus*, to accommodate the new species *Cyclostremiscus (Canimarina) crassilabris*. This species, in their opinion, had characters which could ally it to the genera *Cyclostremiscus*, *Miralabrum*, *Teinostoma* and *Climacia*, but could be considered as a new subgenus due to its own different and unique characters.

PILSBRY & OLSSON (1950) revised the genus and gave the following description: *"The shell is wider than high, with a dome-shaped or low-conic spire of few (3 or 4) whorls, carinate periphery and more or less convex base. The protoconch is smooth, of scarcely more than one convex whorl to 1 ¼. Sculpture of close, usually punctate, spiral striation and radial wavelike ribs on the base, sometimes on the upper surface also. The aperture is oblique, quadrangular or triangular, with a thickened peristome, the outer lip is angular or often extended at the termination of the keel. Umbilicus bordered by a spirally emerging callous rib, terminating at the columella or in the genus* Subclimax *it fills the umbilicus"*.

PILSBRY & OLSSON (1950) divided *Anticlimax* into two subgenera:

-Subgenus *Anticlimax s. str.*: characterized by having the umbilicus open, bordered by a spiral cord which terminates in the columella in a small triangular callus. Type species: *Anticlimax calliglypta* (Dall).

-Subgenus *Subclimax*: characterized by having an umbilicus, totally or partially closed by a solid column which terminates in a callus fused to the columella. Type species: *A. hispaniolensis* Pilsbry & Olsson, 1950.

FABER (2007) considered *Canimarina* a valid genus, comparing it only with *Cyclostremiscus*, and placing it in Vitrinellidae solely on the basis of its lacking "a clear apertural varix". Also he considered *Solariorbis decipiens* Olsson & McGinty, 1958 a junior synonym of *Cyclostremiscus (Canimarina) crassilabris*.

In our opinion (see also RUBIO *ET AL.*, 2011) *Canimarina* must be considered a synonym of *Anticlimax* for the following reasons:

-*Cyclostremiscus (Canimarina) crassilabris* shares all the generic characters of *Anticlimax*.

-The stated date of publication for *Anticlimax* is July and that of *Canimarina* is August of the same year, giving the former priority.

FABER (2012) questioned the synonymy of *Canimarina* proposed by RUBIO ET AL. (2011) arguing the presence of *"a sutural to suprasutural keel and near flat spire"* and "a *reticulate sculpture on the first postnuclear whorl"*, as sufficient characters for a generic morphological differentiation.

At present the genus *Anticlimax* groups together species of very different shape (*A. proboscidea*, *A. decorata*, *A. callyglypta*, for example), whose keels, located in different positions, develop spirally into different apertures according to the species.

In our opinion, the presence of reticular sculpture on the first whorl of the teleoconch and a sutural to suprasutural keel, are not sufficient morphological characters for a generic separation, above all if we take into account that this is a genus where only the shells are known.

Given that *Anticlimax* was proposed before *Canimarina*, and that its descrip-

tion is sufficient to encompass the different known species, we continue to consider *Anticlimax* a valid genus and *Canimarina* its junior synonym. For these reasons, *Canimarina crassilabris, C. glabra* and *C. rostrata*, should be returned to genus *Anticlimax*.

Nothing was known so far about the animal, radula and operculum of *Anticlimax*. Its generic assignment has been based only on the distinguishing characters of the shell, such as overall shape, the radial folds on the base, the angular shape of the external lip, and the zigzagging spiral grooves, among others.

In the Caribbean most of the known species are fossils from the Miocene and Plio-Pleistocene. There are few recent species described, and they occur in North Carolina, Florida, Cuba, Mexico, Nicaragua and Belize.

Rubio, Fernández-Garcés & Rolán (2011), in their revision of the family Tornidae in the Caribbean and neighbouring areas, studied 8 Recent species (some of them also known as fossils) of *Anticlimax*, of which one was new for science. Two fossil and poorly studied species were also recorded: *Anticlimax schumoi* (Vanatta, 1913) and *A. athleenae* (Pilsbry & McGinty, 1946). These species are:

- *Anticlimax crassilabris* (Aguayo & Borro, 1946)
- *Anticlimax glabra* Rubio, Rolán & Pelorce, 2011
- *Anticlimax decorata* Rolán, Fernández-Garcés & Rubio, 1997
- *Anticlimax proboscidea* (Aguayo, 1949)
- *Anticlimax pilsbryi* (McGinty, 1945)
- *Anticlimax locklini* Pilsbry & Olsson, 1950
- *Anticlimax annae* Pilsbry & Olsson, 1950
- *Anticlimax hispaniolensis* Pilsbry & Olsson, 1950
- *Anticlimax athleenae* (Pilsbry & McGinty, 1946) fossil
- *Anticlimax schumoi* (Vanatta, 1913) fossil

Other Recent worldwide species, most of them also registered in WoRMS (2013) (except *carinata, rostrata, niasensis* and *padangensis*) are the following:

Pacific Ocean

Anticlimax occidens Pilsbry & Olsson, 1952. S of Punta Final, San Luis Gonzaga Bay, Baja California, Mexico (20 fms).

Anticlimax willetti Hertlein & Strong, 1951. Costa Rica (Keen, 1971: 386). Ft. Amador Beach, Canal Zone, Panama (intertidal in hermit crab colony).

Anticlimax carinata (A. Adams, 1863). Japan: see below in Discussion.

Anticlimax rostrata (Hedley, 1900). Australia: see below in Discussion.

Indian Ocean

Anticlimax niasensis (Thiele, 1925): see below in Discussion.

Anticlimax padangensis (Thiele, 1925): see below in Discussion.

Anticlimax arifca (Bartsch, 1915) is presented in some lists of this genus but it is not an *Anticlimax*: see below in Discussion.

Therefore 16 species were known: 10 in the Caribbean and 6 in the Indian and Pacific Oceans. Here we add 42 new species from the Tropical South Pacific.

Species studied in this work:

Due to the great diversity of shapes observed in the tropical species studied we have considered that the use of subgenera in order to separate more easily the species of this group was not practical, mainly because we have no information on their anatomy, radular and molecular data; thus, we will place all species studied in genus *Anticlimax*.

The generic assignment has been based only on the distinguishing characters of the shell. In order to facilitate study, species were grouped according to shell morphology. Some of the known species are also fossil from the Miocene and Plio-Pleistocene.

Some of the characters mentioned in the original description of the genus *Anticlimax* cannot be considered absolute and therefore valid for all the species included in this genus: a smooth protoconch, for example. In former times the protoconch was not correctly examined, employing only low magnification, while in SEM photography, the very minute microsculpture can be

observed. Also, the number of whorls of the protoconch mentioned (*"... more than one convex whorl to 1 ¼."*) cannot be considered as more than a character present in the few species known at that moment, becoming more variable when more species have been studied.

Differential characters of *Anticlimax* according to the original description:

1. Shell wider than high;
2. With a dome-shaped or low-conic spire;
3. Carinate periphery;
4. Sculpture of close, usually punctate spiral striation (changed to oval depressions or zigzag cords and cordlets) and radial wavelike ribs on the base, sometimes appearing also on the upper surface;
5. Aperture oblique, quadrangular or triangular;
6. Outer lip angular or often expanded at the termination of the keels;
7. Umbilicus bordered by a spirally emerging callous rib; terminating at the columella or filling the umbilicus.

To these we can add:

8. The protoconch smooth or sculptured by tubercles, between 1 and 2 ½ whorls.
9. Teleoconch with spiral zigzag grooves and cordlets. The microsculpture of the species of the genus *Anticlimax* is not capricious. There is an ontogenetic model which is repeated from one species to another. Even in a single shell it is possible to recognize several stages of this process. This succession between some microsculptures is shown in Fig. 3 (see explanation below).
10. In some species, there may be areas on the adapical part on which the sculpture has almost disappeared.
11. The operculum is rounded and multispiral with a central nucleus (Figs. 2B-C).
12. The radula (Figs. 2D-E) is taenioglossate.
13. Microsculpture: The simplest pattern which frequently appears in the species of this genus at the beginning of the teleoconch is that represented in Fig. 3A: on a smooth surface some small rounded depressions aligned spirally, appear. In the following state (Fig. 3B), these small depressions increase in size, being rounded or oval in form. In Fig. 3C is represented this state in which there is an increase of the depressed areas so that some of them touch each other: the contact of the depressed areas (Fig. 3D) is constant and the areas between depressions rise into cords with prolongations. These prolongations may be vertical or a little oblique. In this case, there are spiral cords with zigzag borders. Sometimes these cords are wide, on other occasions (Fig. 3E), they may change to a narrow fillet. In Fig. 3F the spiral cord is enlarged and, in the enlarged areas, rounded nodules are formed. This usually happens in the spiral cords closer to the suture. In other patterns (Fig. 3G), the spiral cords present fine prolongations which come into contact with other similar rectangular spaces. This pattern is frequent in the last part of the last whorl. On this pattern (Fig. 3H) of rectangular depressed areas, some fine and irregular spiral lines appear. The spiral cords are wider and have a variable border (Fig. 3I). Sometimes, the prolongations in the spiral cords are fine and much more numerous (Fig. 3J). On other occasions they have scarce undulating prolongations (Fig. 3K). Finally, on some occasions they are very irregular and variable showing microsculpture between the cords (Fig. 3L).

Grouping:

Bearing all these characters in mind, we can group the studied species into several well defined and differentiated groups, from 1 to 6, plus another of non-characteristic grouped species. Due to the lack of information on soft parts, radula and DNA, we chose not to introduce different generic or subgeneric names, which would only be justified after more detailed knowledge of the group.

The description order of the species will be made presenting them within the mentioned groups.

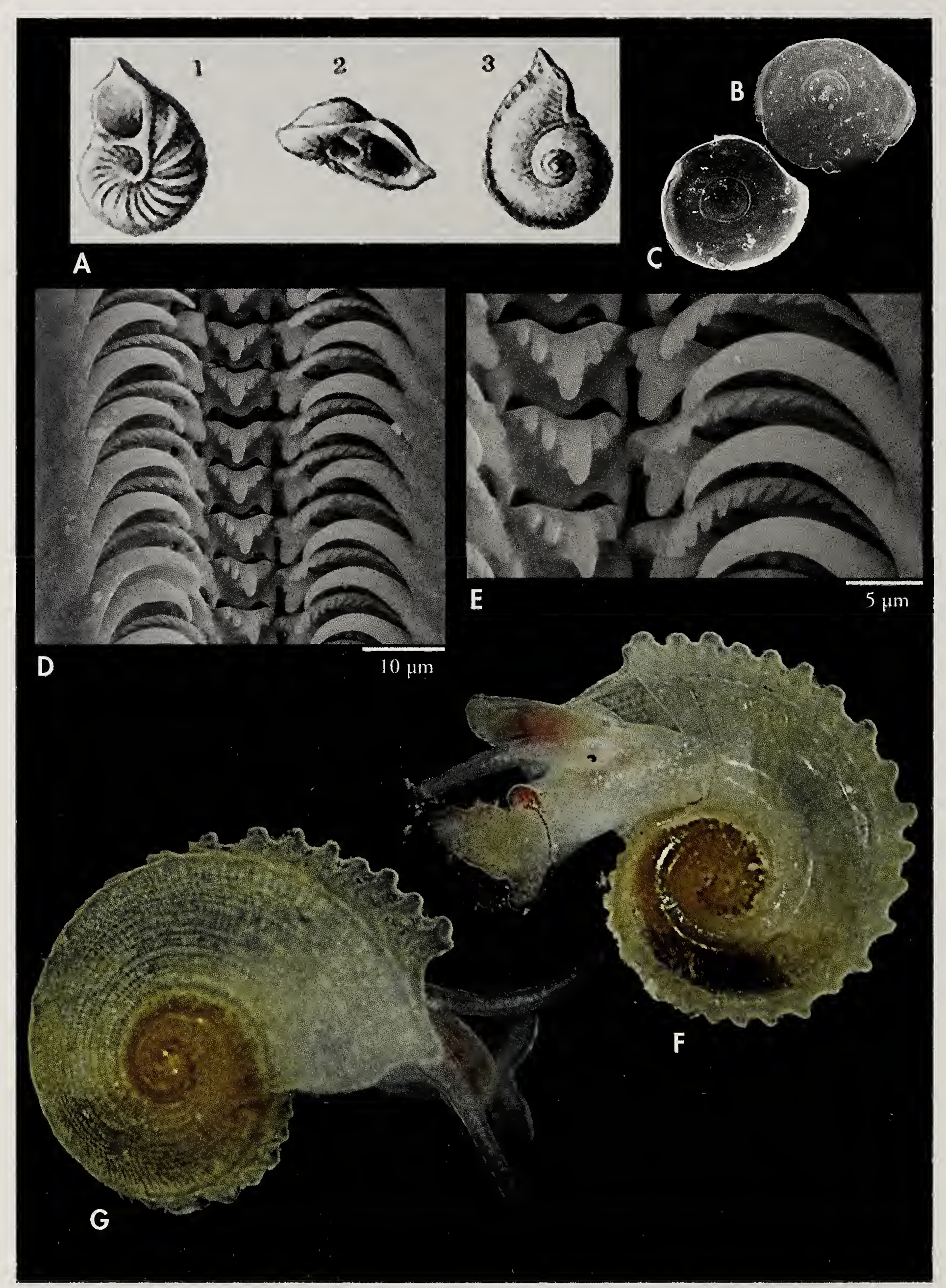


Figure 2. A: Original figures of *Teinostoma (Climacia) calliglyptum* Dall, 1903, type species of genus *Anticlimax* Pilsbry & McGinty, 1946 (Florida, Pliocene fossil); B-C: Opercula of *Anticlimax maranii* (600 and 450 µm respectively); D-E: radula of *A. maranii*. F-G: soft parts of *Anticlimax* cf. *cyclist* spec. nov.

Figura 2. A: Figuras originales de Teinostoma (Climacia) calliglyptum *Dall, 1903, especie tipo del género* Anticlimax *Pilsbry y McGinty, 1946 (Florida, fósil del Plioceno); B-C: Opérculos de* Anticlimax maranii *(600 y 450 µm respectivamente); D-E: rádula de* A. maranii; F-G: *partes blandas de* Anticlimax *cf.* cyclist *spec. nov.*

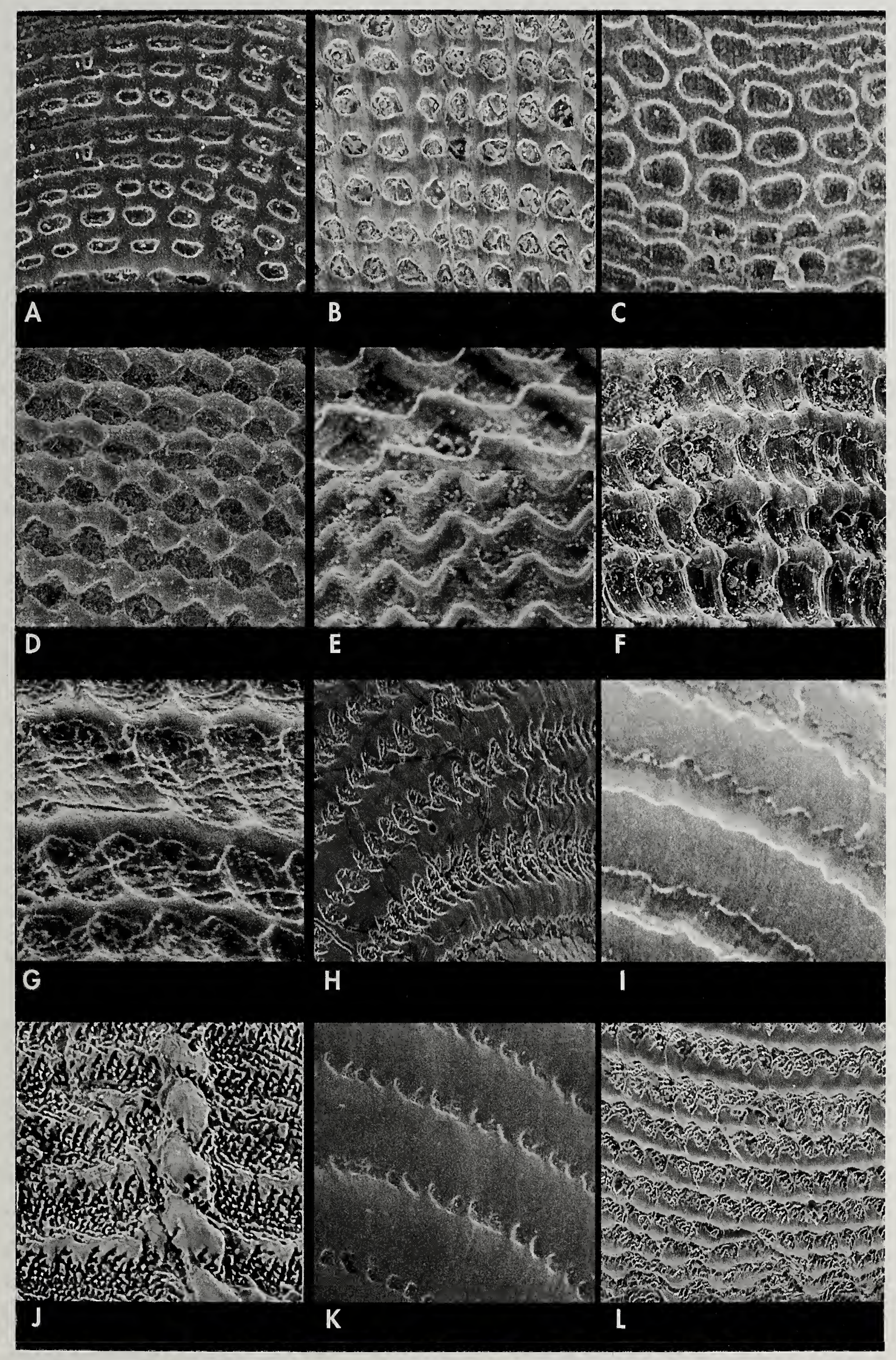


Figure 3. Different aspects of the microsculpture of *Anticlimax* species. See the text.
Figura 3. Diferentes aspectos de la microescultura de las especies de Anticlimax. *Véase el texto.*

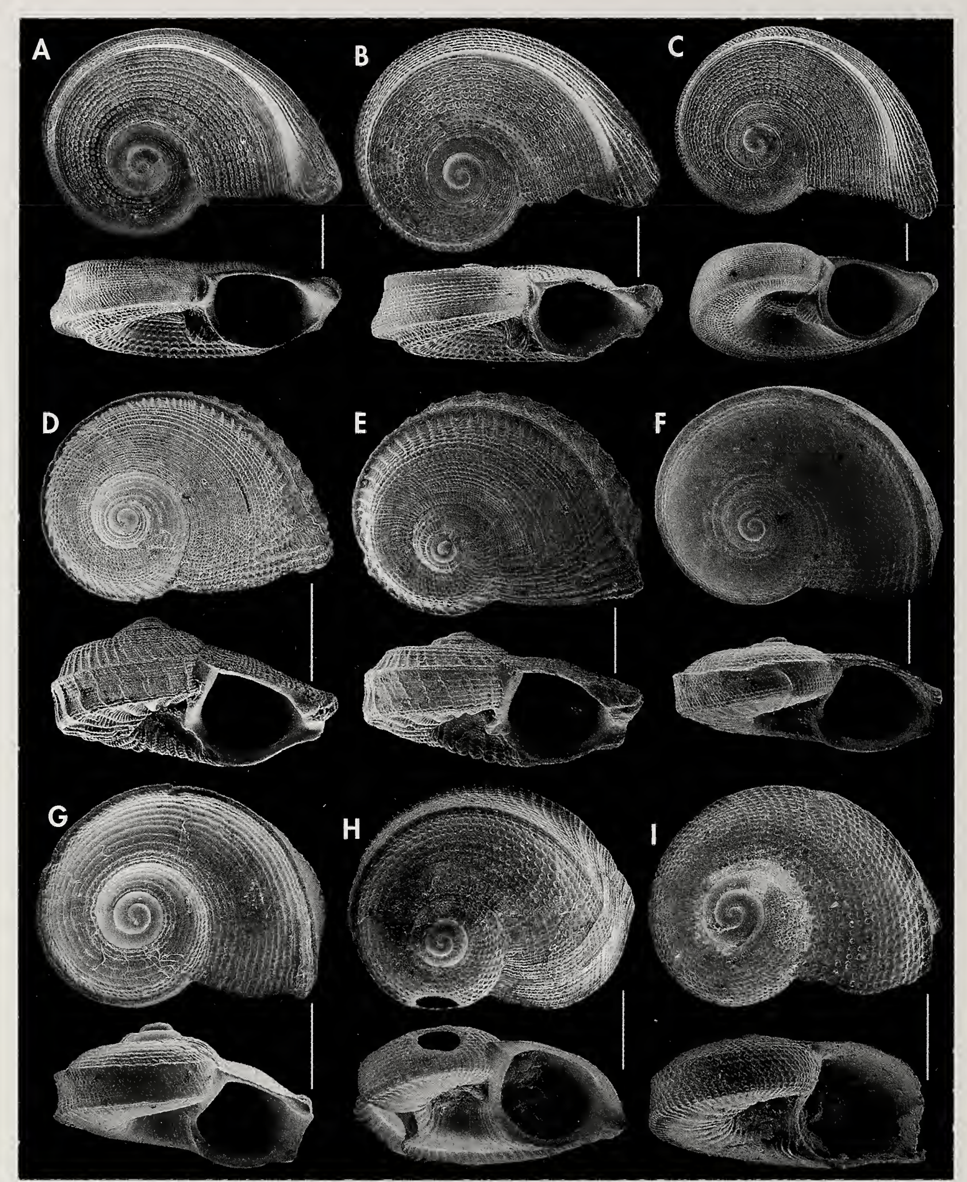


Figure 4. Synopsis of *Anticlimax* species. A: *A. faviformis* spec. nov., holotype, 2.3 mm and paratype, 2.2 mm, New Caledonia. B: *A. simulans* spec. nov., holotype, 2.2 mm, Philippines. C: *A. umbiliglabra* spec. nov., holotype, 1.75 mm, Philippines. D: *A. fecunda* spec. nov., holotype, 2.24 mm, New Caledonia. E: *A. robusta* spec. nov., holotype, 2.46 mm and shell, 2.2 mm, Philippines. F: *A. infaceta* spec. nov., 2.15 mm, holotype, Philippines. G: *A. bicornis* spec. nov., holotype, 1.66 mm, Solomon. H: *A. singularis* spec. nov., holotype, 1.66 mm, Philippines (MNHN). I: *A. puncticulata* spec. nov., holotype, 1.29 mm, Philippines. All shells at MNHN.

Figura 4. Sinopsis de las especies de Anticlimax. *A:* A. faviformis *spec. nov., holotipo, 2,3 mm y paratipo, 2,2 mm, Nueva Caledonia. B:* A. simulans *spec. nov., holotipo, 2,2 mm, Filipinas. C:* A. umbiliglabra *spec. nov., holotipo, 1,75 mm, Filipinas. D:* A. fecunda *spec. nov., holotipo, 2,24 mm, Nueva Caledonia. E:* A. robusta *spec. nov., holotipo, 2,46 mm y concha, 2,2 mm, Filipinas. F:* A. infaceta *spec. nov., 2,15 mm, holotipo, Filipinas. G:* A. bicornis *spec. nov., holotipo, 1,66 mm, Salomón. H:* A. singularis *spec. nov., holotipo, 1,66 mm, Filipinas. I:* A. puncticulata *spec. nov., holotipo, 1,29 mm, Filipinas (MNHN). Todas las conchas en MNHN.*

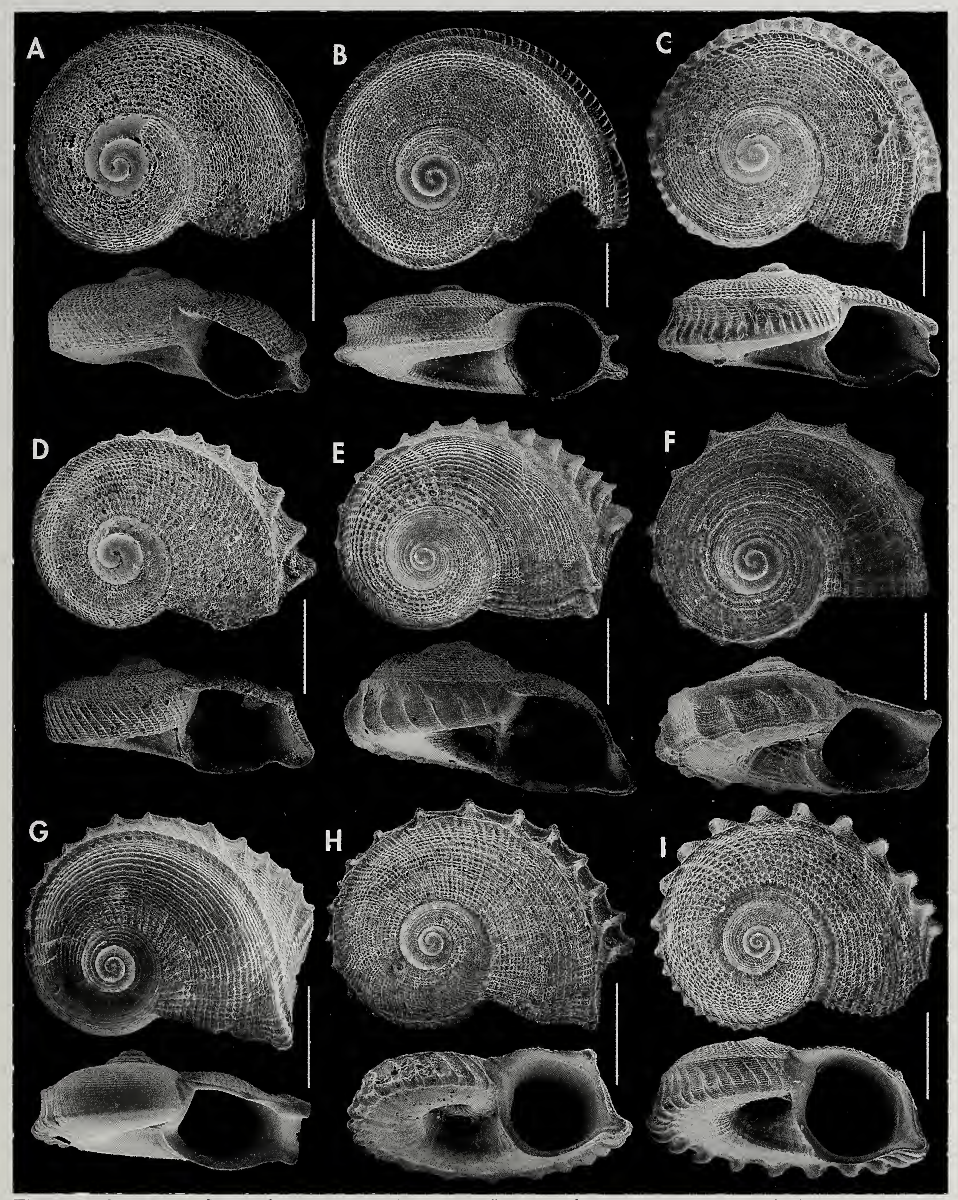


Figure 5. Synopsis of *Anticlimax* species (continued). A: *A. bicarinata* spec. nov., holotype, 1.3 mm, Vanuatu. B: *A. fijiensis* spec. nov., holotype, 1.64 mm, Fiji. C: *A. maranii* spec. nov., holotype, 1.8 mm, Philippines. D: *A. reinaudi* spec. nov., holotype, 1.26 mm, Vanuatu. E: *A. serrata* spec. nov., holotype, 2.47 mm, Vanuatu. F: *A. tamarae* spec. nov., holotype, 1.65 mm, Solomon. G: *A. aitormonzoi* spec. nov., holotype, 2.76 mm, Philippines. H: *A. cyclist* spec. nov., holotype, 2.68 mm Philippines (MNHN); I: *A. dentata* spec. nov., holotype, 2.3 mm, Philippines. All shells at MNHN.

Figura 5. Sinopsis de las especies de Anticlimax *(continuación). A:* A. bicarinata *spec. nov., holotipo, 1,3 mm, Vanuatu. B:* A. fijiensis *spec. nov., holotipo, 1,64 mm, Fiyi. C:* A. maranii *spec. nov., holotipo, 1,8 mm, Filipinas. D:* A. reinaudi *spec. nov., holotipo, 1,26 mm, Vanuatu. E:* A. serrata *spec. nov., holotipo, 2,47 mm, Vanuatu. F:* A. tamarae *spec. nov., holotipo, 1,65 mm, Salomón. G:* A. aitormonzoi *spec. nov., holotipo, 2,76 mm, Filipinas. H:* A. cyclist *spec. nov., holotipo, 2,68 mm Filipinas; I:* A. dentata *spec. nov., holotipo, 2,3 mm, Filipinas. Todas las conchas en MNHN.*

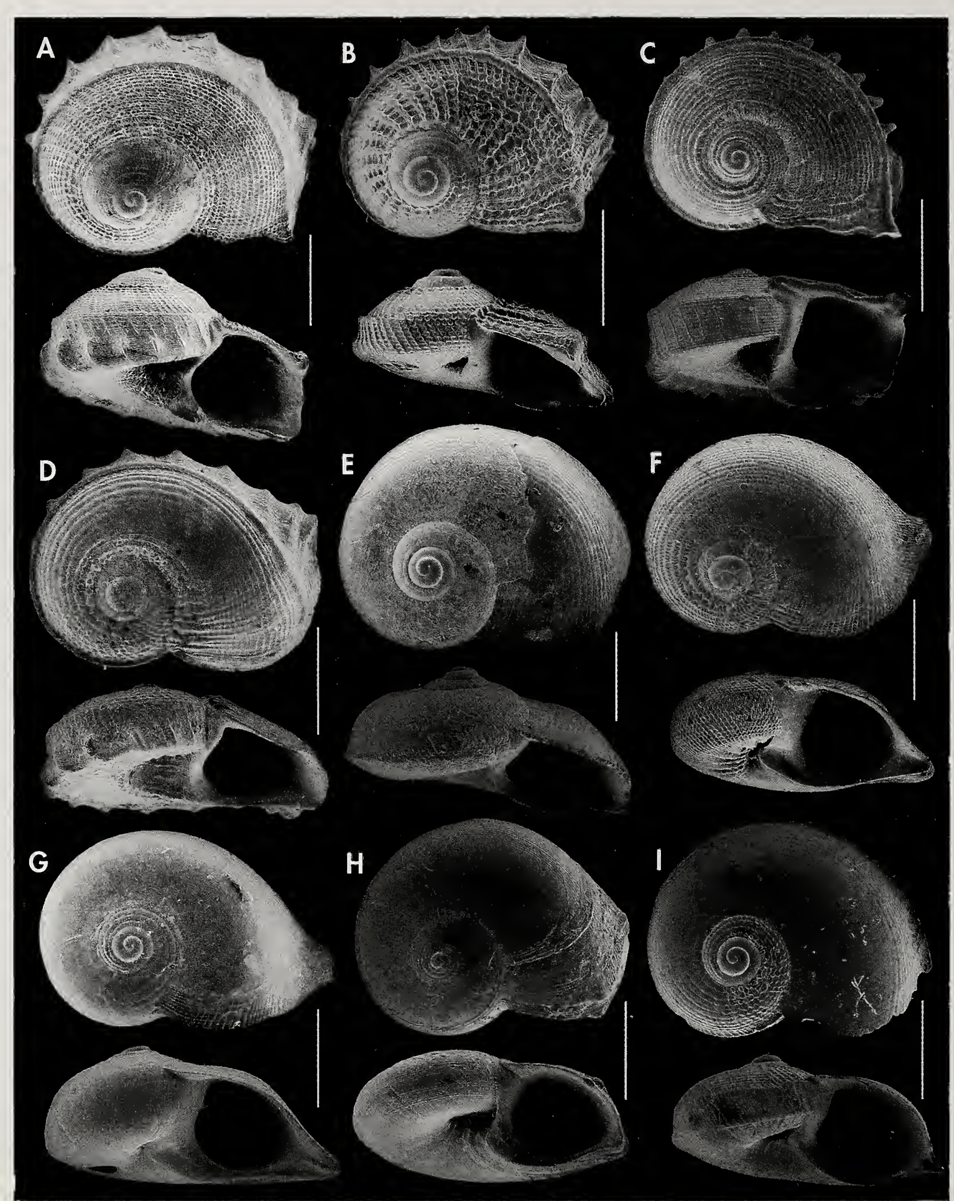


Figure 6. Synopsis of *Anticlimax* species (continued). A: *A. elata* spec. nov., holotype, 1.34 mm, Philippines. B: *A. solomonensis* spec. nov., holotype, 1.5 mm, Solomon. C: *A. fastigata* spec. nov., holotype, 2.67 mm, Papua New Guinea. D: *A. rhinoceros* spec. nov., holotype, 1.65 mm, Papua New Guinea. E: *A. textilis* spec. nov., holotype, 2.09 mm, New Caledonia. F: *A. vanuatuensis* spec. nov., holotype, 1.35 mm, Vanuatu. G: *A. levis* spec. nov., holotype, 2.0 mm, Philippines. H: *A. spiralis* spec. nov., holotype, 2.44 mm, Vanuatu. I: *A. simplex* spec. nov., holotype, 2.0 mm, Vanuatu. All shells at MNHN.
Figura 6. Sinopsis de las especies de Anticlimax *(continuación). A:* A. elata *spec. nov., holotipo, 1,34 mm, Filipinas. B:* A. solomonensis *spec. nov., holotipo, 1,5 mm, Salomón. C:* A. fastigata *spec. nov., holotipo, 2,67 mm, Papua Nueva Guinea. D:* A. rhinoceros *spec. nov., holotipo, 1,65 mm, Papua Nueva Guinea. E:* A. textilis *spec. nov., holotipo, 2,09 mm, Nueva Caledonia. F:* A. vanuatuensis *spec. nov., holotipo, 1,35 mm, Vanuatu. G:* A. levis *spec. nov., holotipo, 2,0 mm, Filipinas. H:* A. spiralis *spec. nov., holotipo, 2,44 mm, Vanuatu. I:* A. simplex *spec. nov., holotipo, 2,0 mm, Vanuatu. Todas las conchas en MNHN.*

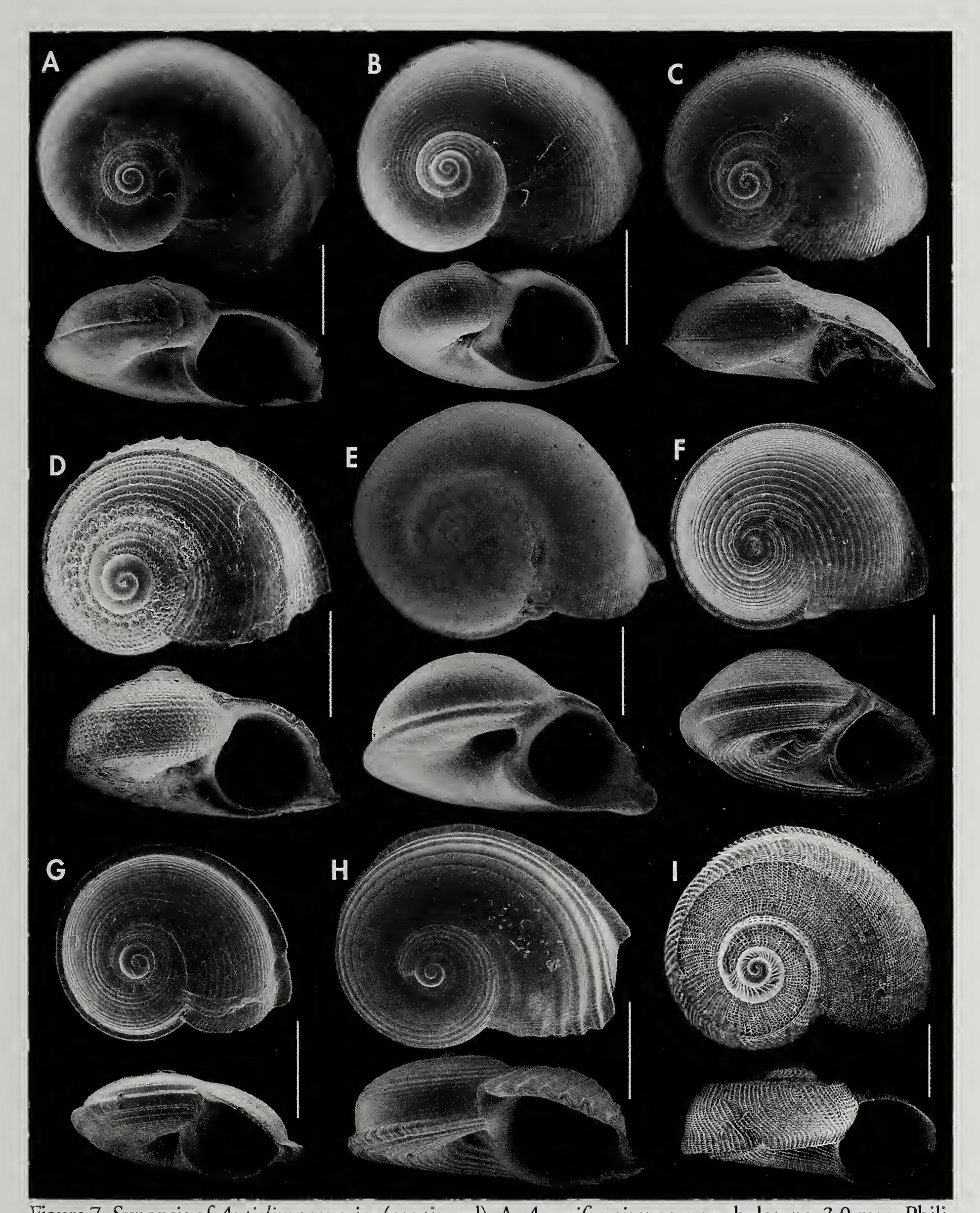


Figure 7. Synopsis of *Anticlimax* species (continued). A: *A. uniformis* spec. nov., holotype, 3.0 mm, Philippines. B: *A. maestratii* spec. nov., holotype, 2.6 mm and paratype 2.0 mm, Philippines. C: *A. philippinensis* spec. nov., holotype, 1.66 mm, Philippines. D: *A. imitatrix* spec. nov., holotype, 1.3 mm, Solomon Islands. E: *A. tentorii* spec. nov., holotype, 4.2 mm, Vanuatu. F: *A. discus* spec. nov., holotype, 1.78 mm, Philippines. G: *A. lentiformis* spec. nov., holotype, 1.46 mm, Fiji. H: *A. globulus* spec. nov. holotype, 2.6 mm, Papua New Guinea. I: *A. boucheti* spec. nov., holotype, 1.6 mm, New Caledonia. All shells at MNHN.

Figura 7. Sinopsis de las especies de Anticlimax *(continuación). A:* A. uniformis *spec. nov., holotipo, 3,0 mm, Filipinas. B:* A. maestrati *spec. nov., holotipo, 2,6 mm and paratype 2.0 mm, Filipinas. C:* A. philippinensis *spec. nov., holotipo, 1,66 mm, Filipinas. D:* A. imitatrix *spec. nov., holotipo, 1,3 mm, Salomón. E:* A. tentorii *spec. nov., holotipo, 4,2 mm, Vanuatu. F:* A. discus *spec. nov., holotipo, 1,78 mm, Filipinas. G:* A. lentiformis *spec. nov., holotipo, 1,46 mm, Fiyi. H:* A. globulus *spec. nov. holotype, 2,6 mm, Papua Nueva Guinea. I:* A. boucheti *spec. nov., holotipo, 1,6 mm, Nueva Caledonia. Todas las conchas en MNHN.*

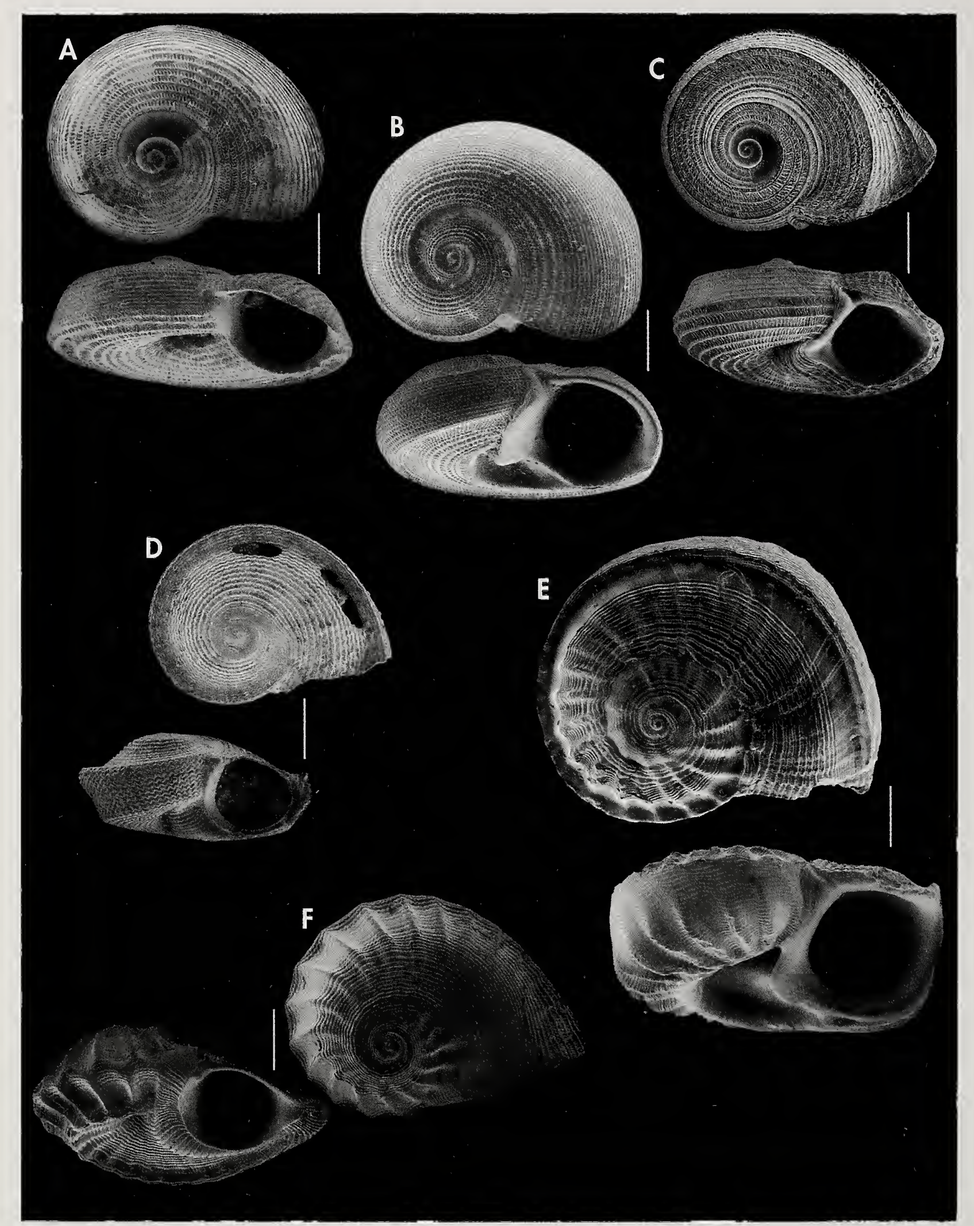


Figure 8. Synopsis of *Anticlimax* species (continued). A: *A. philsmithi* spec. nov., holotype, 1.5 mm and paratype, 1.67 mm, Papua New Guinea. B: *A. simplicissima* spec. nov., holotype, 2.3 mm, Papua New Guinea. C: *A. virginiae* spec. nov., holotype, 1.93 mm, Vanuatu. D: *A. religiosa* spec. nov., holotype, 1.4 mm, Philippines. E: *A. obesa* spec. nov., holotype, 5.9 mm, Philippines. F: *A. juanae* spec. nov., holotype, 2.55 mm, New Caledonia. All shells at MNHN.

Figura 8. Sinopsis de las especies de Anticlimax *(continuación). A:* A. philsmithi *spec. nov., holotipo, 1,5 mm and paratype, 1,7 mm, Papua Nueva Guinea. B:* A. simplicissima *spec. nov., holotipo, 2,3 mm, Papua Nueva Guinea. C:* A. virginiae *spec. nov., holotipo, 1,93 mm, Vanuatu. D:* A. religiosa *spec. nov., holotipo, 1,4 mm, Filipinas. E:* A. obesa *spec. nov., holotipo, 5,9 mm, Filipinas. F:* A. juanae *spec. nov., holotipo, 2,55 mm, Nueva Caledonia. Todas las conchas en MNHN.*

Table I. Differences between species of group 1.
Tabla I. Diferencias entre las especies del grupo 1.

Protoconch	Proto nº whorls	Diameter in µm	Nucleus diameter in µm	Number of axial ribs	Rough surface
A. faviformis	1	200-240	60	10	nucleus and ½ whorl
A. simulans	1 1/4	290	50	28-30	no
A. umbiliglabra	1	260	70	10	all the surface

GROUP 1

Description: Shell depressed; protoconch with numerous lines of interruption -growth, which are like axial ribs; teleoconch bicarinate, formed by cells of unequal size aligned in a spiral direction. Aperture triangular; external lip expanded laterally outwards.

It is formed by 3 species: *A. faviformis, A. simulans* and *A. umbiliglabra*. In Table I we show the most important differences of the protoconch.

Anticlimax faviformis spec. nov. (Figures 4A, 9A-F)

Type material: Holotype MNHN 27171 (Figs. 4A, 9A) and 4 paratypes MNHN 27172 (Figs. 9B-C).
Material examined: (5 s): Only those of the type locality.
Type locality: New Caledonia, Lagoon of Grand Récif Mengalia, Touho area, 20°44.5'S, 165°15.9'E, 8 m [MONTROUZIER: Stn. 1264].
Etymology: The specific name derives of the Latin words *favus, -i* "honeycomb" and *formis* "form", alluding to the sculpture of the shell.

Distribution: Only known from New Caledonia at 8 m.

Description: Shell small, formed by about 3 ¼ whorls of quick growth, with a flat spire and the periphery delimited by two thick spiral carinae.

Protoconch with only one whorl, 220-230 µm in diameter and about 60 µm across the nucleus; its surface has two distinct phases: the first is formed by the nucleus and ½ whorl and ends in the first slight thickening; and the second phase, in which there are about 10 successive thickenings, forming axial ribs. The teleoconch has 2 ¼ whorls, with the periphery with the two mentioned carinae: a basal one, thicker and prominent, and an adapical one, not so thick; both forming an angle on the shell. Profile with a flat or scarcely concave periphery and concave base.

Ornamentation formed by spiral cords of unequal size that are crossed by axial striae forming small cells, which are spirally aligned and have different shape and size; those at the base, and specially in the umbilical area, are larger than the others. Aperture oval, prosocline; parietal area with a thick callous coating; columella reflected externally; outer lip thin, with sharp edge, presenting an extension in the area between the two carinae, which gives it a distinctive profile. Umbilicus narrow and deep; umbilical margin closes in progressively and in the area next to the columella forms a callus of triangular shape, on whose surface spiral cordlets develop.

Dimensions: the holotype measures 2.3 mm in diameter.

Habitat: Infralittoral species collected on sandy mud bottom, at 8 m depth.

Remarks: This new species is characterized by its very flat spire, the thick peripheral carinae, the rows of cells of different size and shape spirally aligned and covering completely the shell; the convex base and the outer lip with a prolongation in the periphery. The most similar species are the other two included in this first group: see below the comparison of all three.

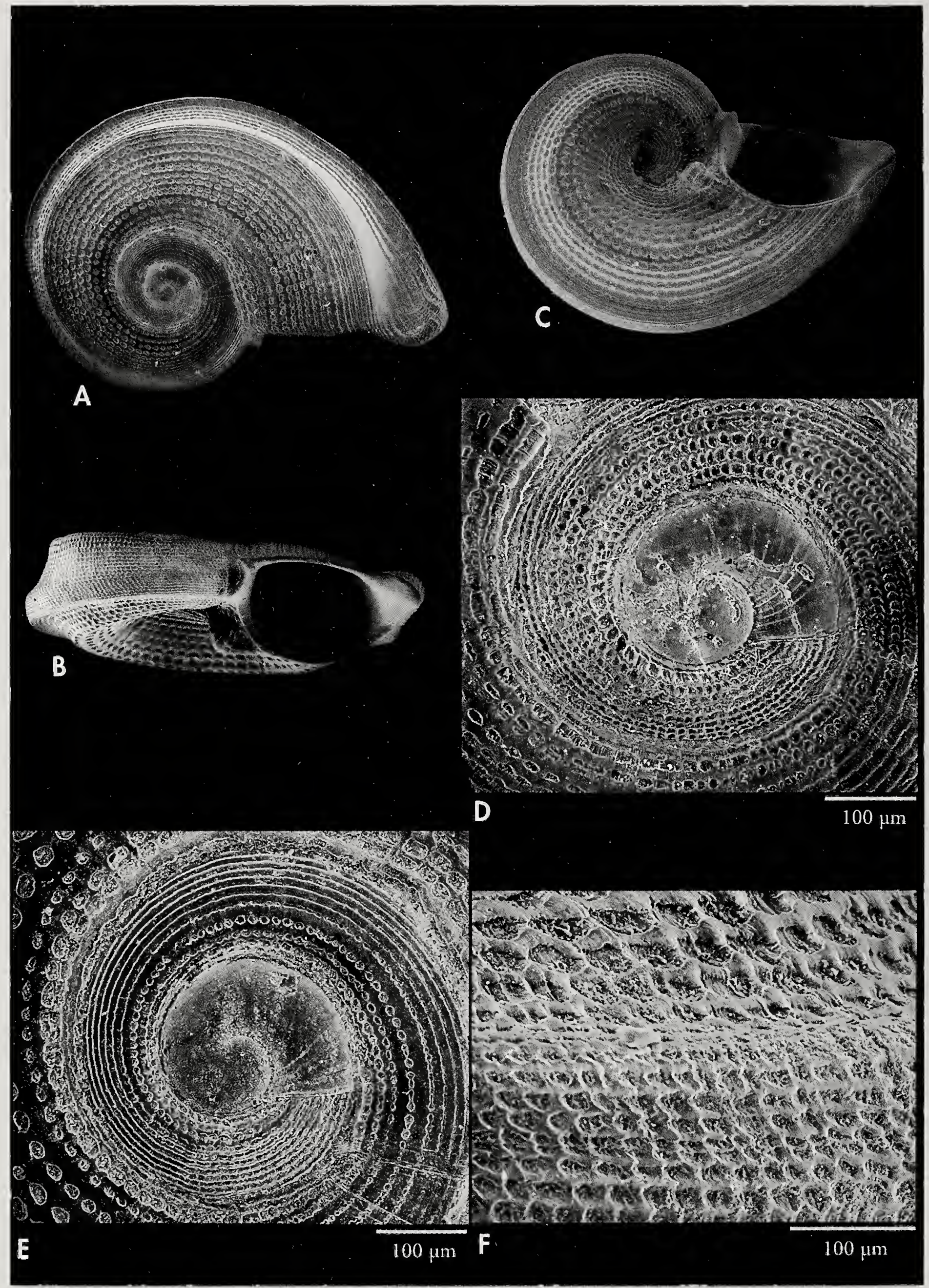


Figure 9A-F. *Anticlimax faviformis* spec. nov. A: holotype, 2.3 mm (MNHN); B-C: paratype, 2.2 (MNHN); D: protoconch of the paratype of figs. B-C; E: protoconch of the holotype; F: microsculpture. All from New Caledonia, Touho area, Lagoon of Grand Récif Mengalia, Stn. 1264, 8 m.

Figura 9A-F. Anticlimax faviformis *spec. nov. A: holotipo, 2,3 mm (MNHN); B-C: paratipo, 2,2 (MNHN); D: protoconcha del paratipo de las figs. B-C; E: protoconcha del holotipo; F: microescultura. Todo de Nueva Caledonia, alrededores de Touho, Laguna del Grand Récif Mengalia, Stn. 1264, 8 m.*

Anticlimax simulans spec. nov. (Figures 4B, 10A-G, 11A-E)

Type material: Holotype MNHN 27173 (Figs. 4B, 10A-C) and one paratype MNHN (27174).
Material examined: (5 s): Philippines, PANGLAO 2004: 1 s, Panglao Island, lagoon off Poblacion, Stn. S11, 9°33.6′N, 123°43.6′E, 2 m, fine sand and seagrass; 1 s, Pamilacan Island, Stn. S22, 9°29.4′N, 123°56.0′E, 15-20 m, hard ground covered with seagrass; 2 s, Bohol Island, Cortes, Stn. T18, 9°41.8′N, 123°49.9′E, 80-100 m, muddy bottom with sponges (type material). Papua New Guinea: 1 s, N Sek Island, PAPUA NIUGINI, Stn. PS47, 05°04.7′S, 145°48.9′E, 8 m, inner slope.
Type locality: Philippines, Cortes, Bohol Island, 9°41.8′N, 123°49.9′E, 80-100 m, muddy bottom with sponges [PANGLAO 2004: Stn. T18].
Etymology: The specific name alludes to the similarity with the previous species.

Distribution: Only known from the Philippines, between 2 and 80 m, and from Papua New Guinea, at 8 m.

Description: Shell small, formed by 3 whorls of quick growth, with a nearly flat spire and the periphery delimited by two strong spiral carinae.

The protoconch has 1 ¼ whorls, measures about 290 μm in diameter and has two clearly differentiated periods: the first one smooth with less than ½ whorl besides the nucleus and the second, with about 30 thickened ribs.

The teleoconch has 2 ¼ whorls, delimited by two strong peripheral carinae which angle the shell; the basal one is wider and more prominent, and the adapical one, narrower. Profile with a slightly concave periphery and base concave.

Ornamentation formed initially by spiral grooves of similar size which, are about 12 in number at the beginning of the teleoconch and which after ¾ of whorl form small cells by crossing the axial striae; these are spirally aligned and have different shape and size; on the last whorl 17 lines of cells can be observed on the adapical part, 13 on the periphery and 17 on the base, of which those placed in the umbilical area are of larger size than the others.

Aperture oval, prosocline; parietal zone with a strong callous coat; columella reflected externally; external lip thin, with a sharp border, presenting a prolongation in the area included between the two carinae, which give to the shell a characteristic profile. Umbilicus narrow and deep. The umbilical margin closes in progressively and in the area close to the columella, forms a triangular callus, with spiral cordlets crossing the surface.

Dimensions: the holotype measures 2.2 mm in diameter.

Habitat: Infra and circalittoral species collected from Philippines at 2 m, on a fine sand and seagrass bottom (Stn. S11) and at 15-20 m, on a hard ground covered with seagrass (Stn. S22). Also trawled in 80-100 m, on a muddy bottom with sponges PANGLAO 2004 (Stn. T18). In Papua New Guinea at 8 m, on the inner slope (Stn. PS47).

Remarks: *Anticlimax simulans* spec. nov. is very similar to *A. faviformis* spec. nov. from New Caledonia, being differentiated from the latter by the larger size of the protoconch and by having more growth lines, like ribs, in the second period of this. It also differs by having at the beginning of the teleoconch, 12 spiral grooves transformed into small cells after ¾ of whorl; by having a smaller number of lines of cells on the base and by the periphery being slightly concave.

Anticlimax umbiliglabra spec. nov. (Figures 4C, 12A-D)

Type material: Holotype MNHN 27175 (Figs. 4C, 12A-B).
Material examined: Only from the type locality.
Type locality: Philippines, Panglao Island, lagoon off Poblacion, 9°33.6′N, 123°43.6′E, 2 m, fine sand and seagrass [PANGLAO 2004: Stn. S11].
Etymology: The specific name is formed by the words "umbilicus", and *glabra*, "smooth", alluding to the smooth umbilical area which is very different from other species of its group.

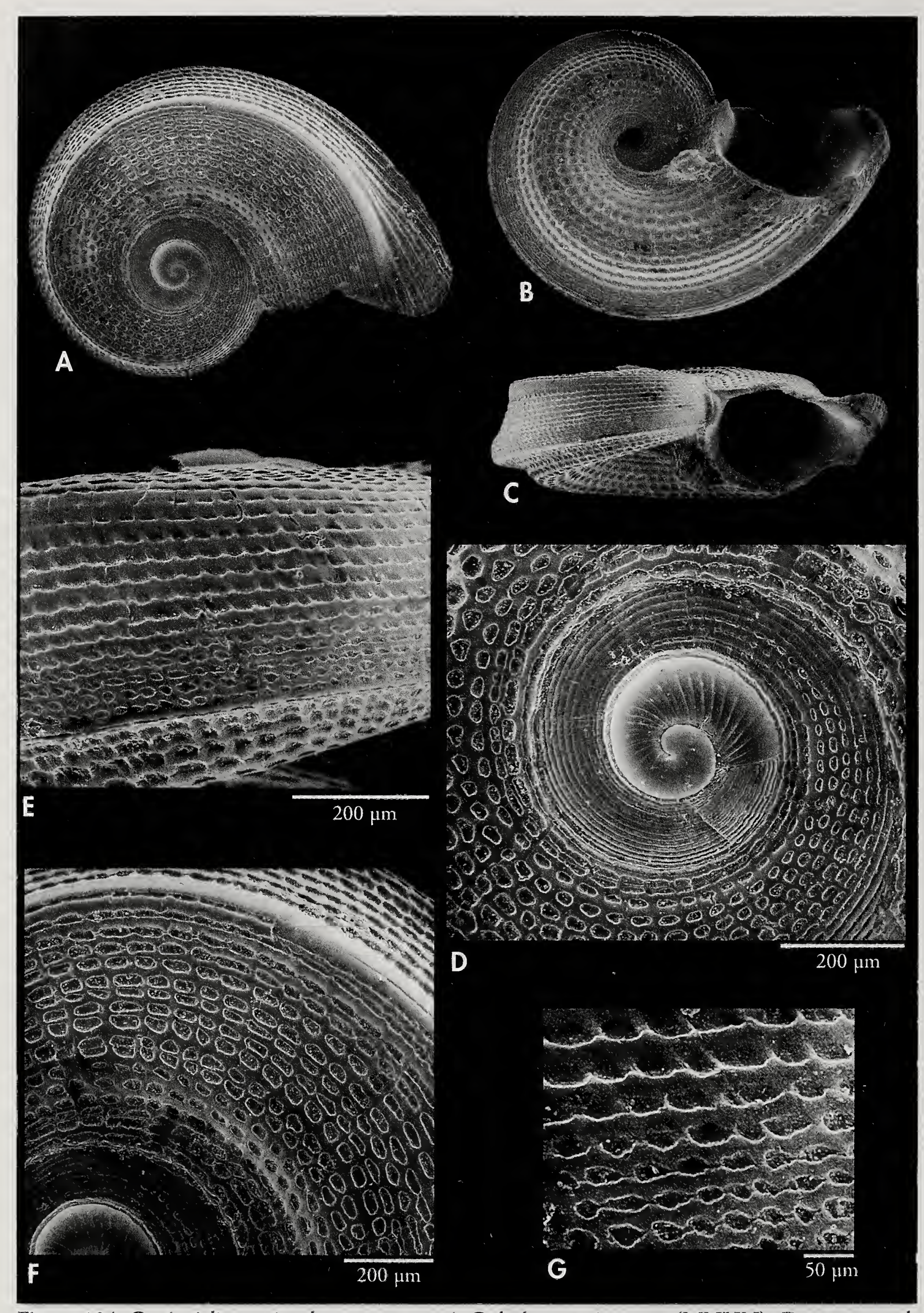


Figure 10A-G. *Anticlimax simulans* spec. nov. A-C: holotype, 2.2 mm (MNHN); D: protoconch of the holotype; E-G: microsculpture and detail. Philippines, Panglao Island, Stn. T18, 80-100 m, in muddy bottom with sponges.

Figura 10A-G. Anticlimax simulans *spec. nov. A-C: holotipo, 2,2 mm (MNHN); D: protoconcha del holotipo; E-G: microescultura y detalle. Filipinas, Isla de Panglao, Stn. T18, 80-100 m, en fondo de fango con esponjas.*

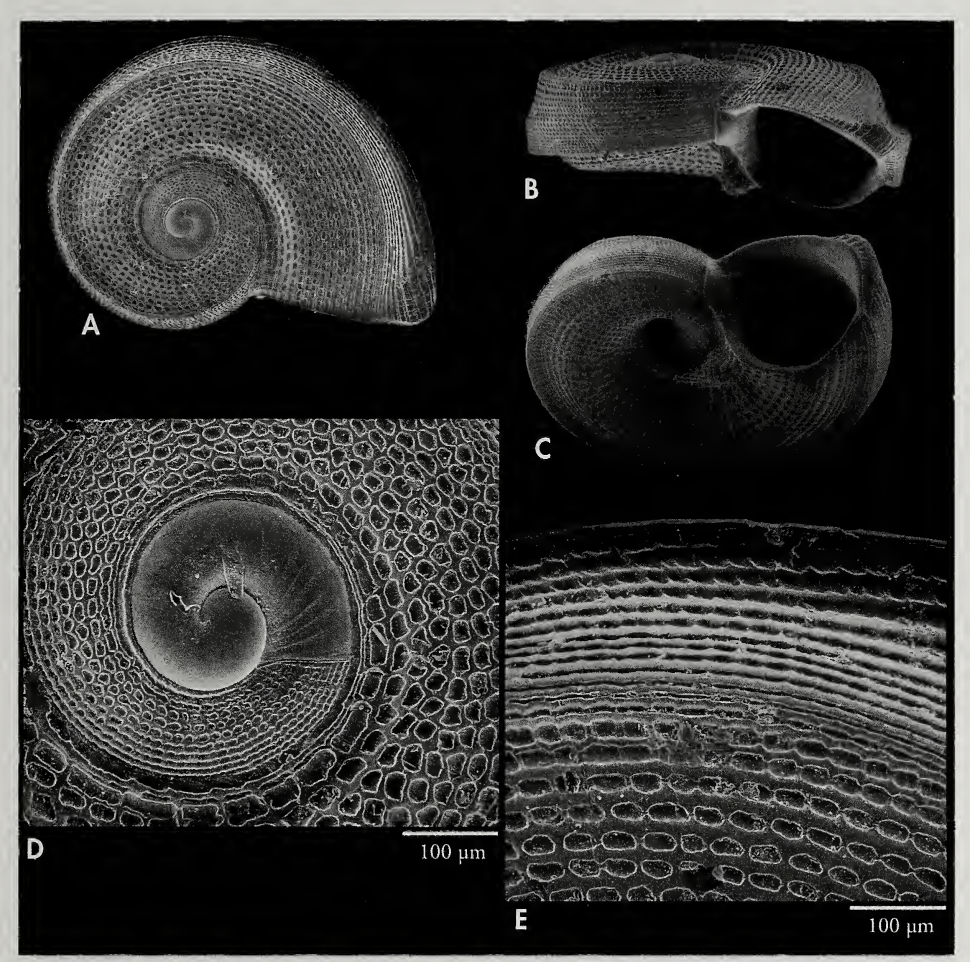


Figure 11A-E: *Anticlimax simulans* spec. nov. A-C: shell, 1.75 mm (MNHN); D: protoconch; E: microsculpture. N Sek Island, Papua New Guinea, PAPUA NIUGINI: PS47, 8 m.
Figura 11A-E: Anticlimax simulans *spec. nov. A-C: concha, 1,75 mm (MNHN); D: protoconcha; E: microescultura. N de la isla de Sek, Papua Nueva Guinea, PAPUA NIUGINI: PS47, 8 m.*

Distribution: Only known from Panglao Island, its type locality, at 2 m.

Description: Shell small (< 2 mm), formed by slightly more than 3 whorls of quick growth, with a nearly flat spire and the periphery delimited by two thick spiral carinae.

The protoconch has only 1 whorl, measuring 260 µm in diameter and it is formed by two distinct phases: the first, rough, has the nucleus and ¾ of whorl, and ends in a slight thickening; in the second phase, there are successive axial thickenings, 8-10 in number, like axial ribs, but keeping the surface rough. The teleoconch has less than 2 ¼ whorls, and is delimited by two thick carinae which angle the shell; the basal carina does not protrude more than the peripheral. Profile with the periphery flattened and base concave.

Ornamentation formed by cells of different shape and size, spirally aligned; there are 8-9 spiral lines at the beginning of the teleoconch and, on the last whorl, in apertural view, can be

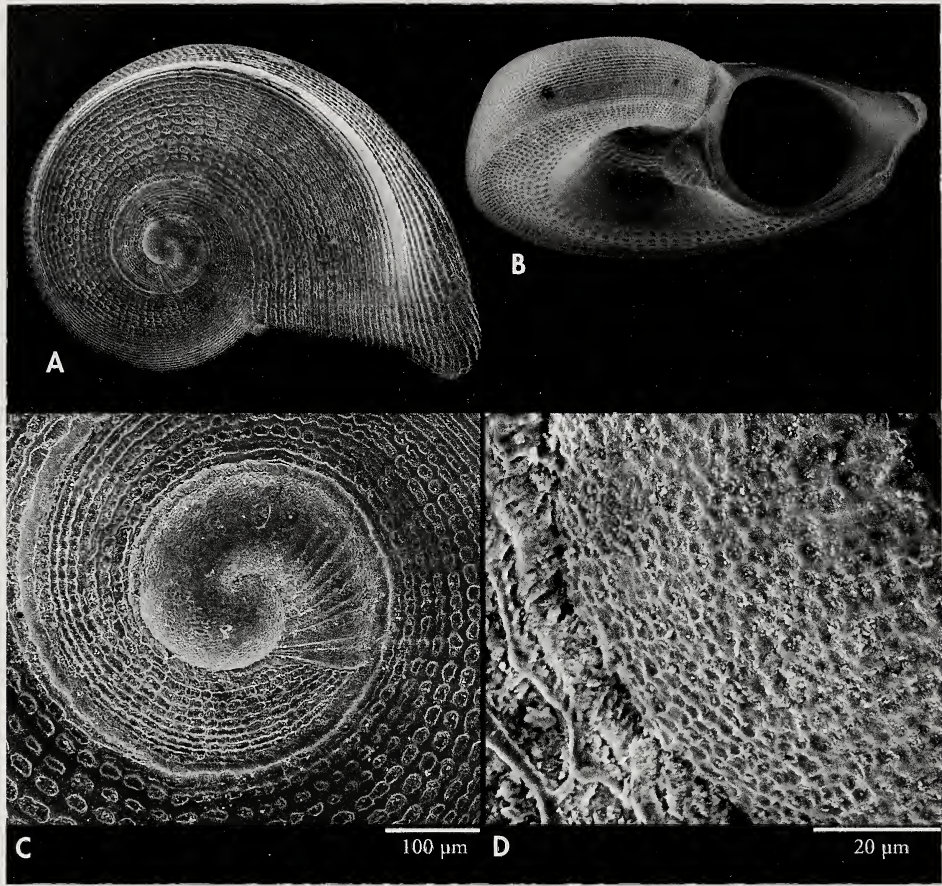


Figure 12A-D. *Anticlimax umbiliglabra* spec. nov. A-B: holotype, 1.75 mm (MNHN); C: protoconch of the holotype; D: microsculpture of the protoconch. Philippines, Panglao Island, Stn. S11, 2 m, in fine sand and seagrass.

Figura 12A-D. Anticlimax umbiliglabra *spec. nov. A-B: holotipo, 1,75 mm (MNHN); C: protoconcha del holotipo; D: microescultura de la protoconcha. Filipinas, Isla de Panglao, Stn. S11, 2 m, en arena fina y pradera.*

observed 15 on the adapical part, 20 on the periphery and 20 on the base. Aperture oval, prosocline; parietal callous area with a thick coating; columella externally reflected; outer lip thin, with a sharp edge, presenting an extension in the area between the two carinae, which give it a distinctive profile. Umbilicus wide and deep; in the periumbilical area there is a wide completely smooth strip, without rows or cells; the umbilical margin in the area close to the columella forms a callus of triangular shape, on whose surface run spiral cordlets.

Dimensions: the holotype measures 1.75 mm in diameter.

Habitat: The species was collected at 2 m, on a fine sand and seagrass bottom (Stn. S11).

Remarks: *Anticlimax umbiliglabra* spec. nov. differs from *A. faviformis* spec. nov. and *A. simulans* spec. nov. by having an entirely rough protoconch, and 8-10 axial ribs in the second phase; by having a flattened periphery; because the basal carina is not protruding, and because it has a large smooth area, without cells or grooves, on the umbilical wall.

Table II. Differences between the species of group 2.
Tabla II. Diferencias entre las especies del grupo 2.

Species	Protoconch n° of whorls	Protoconch diameter in μm	Protoconch microsculpture	Periphery	Carinae	Base sculpture
A. fecunda	1 1/4	280-310	medium tubercles	axial+spiral	not prominent	strong
A. robusta	1 1/2	270	fine spirals+fine tbcs	axial+spiral	not prominent	strong
A. infaceta	1 3/4	310	fine tbcs	only pits	not prominent	attenuated
A. bicornis	2	380	very small tubercles	spiral zigzag lines	slightly prominent	almost disappeared
A. singularis	2	380	oblique lines	attenuated axial +spiral	lower more prominent	attenuated
A. puncticulata	2	380	tubercles + short lines	attenuated axial + spiral	upper one almost disappears	attenuated
A. bicarinata	2	400	very small tubercles	attenuated, spiral zigzag lines	both prominent at the end	attenuated
A. fijiensis	almost 2	340	very small tubercles	attenuated axial + spiral	both rather prominent	appreciable
A. maranii	1 3/4	330	small tubercles	axial predominant	lower one very prominent	attenuated

GROUP 2

Description: Shell wider than high (low conic spire). Protoconch with 2 or more phases; F2 with tubercles. Teleoconch: periphery bicarinate; ornamentation of spiral grooves in zigzag and wavelike ribs on the base and the periphery; those of the base may almost disappear; aperture triangular; outer lip expanded laterally by the end of the carinae, of which the upper one very attenuated at times. Umbilicus with angled border.

Formed by 9 species: *Anticlimax fecunda, A. robusta, A. infaceta, A. bicornis, A. singularis, A. puncticulata, A. bicarinata, A. fijiensis, A. maranii*. See Table II for comparison.

Anticlimax fecunda spec. nov. (Figures 4D, 13A-F, 14A-F)

Type material: Holotype MNHN 27176 (Figs. 4D, 13A-C).
Material examined: (2 s): New Caledonia: 1 s, Lifou, West-Southwest of Pointe d'Easo, Baie du Santal, Loyalty Is., LIFOU 2000: Stn. 1430, 20°47.5'S, 167°07.1'E, 20-25 m (holotype). Vanuatu: 1 s (Fig. 14), NW Tutuba Island, SANTO 2006: Stn. DS108, 15°33.2'S, 167°16.6'E, 100 m.
Type locality: New Caledonia, Loyalty Is., West-Southwest of Pointe d'Easo, Baie du Santal, 20°47.5'S, 167°07.1'E, 20-25 m [LIFOU 2000: Stn. 1430].
Etymology: The specific name is related by the number of spiral cords which are few at the beginning and increase during growth of the spire.

Distribution: Only known from the type locality in New Caledonia, and from NW Tutuba Island, Vanuatu. Between 25 and 100 m.

Description: Shell small, robust, formed by about 3 ½ whorls of rapid growth, with a moderately depressed spire, with two thick carinae angling the shell; umbilicus broad and deep.

The protoconch is at a higher level than the rest of the shell, measuring between 280-310 μm, having 1 ¼ whorls

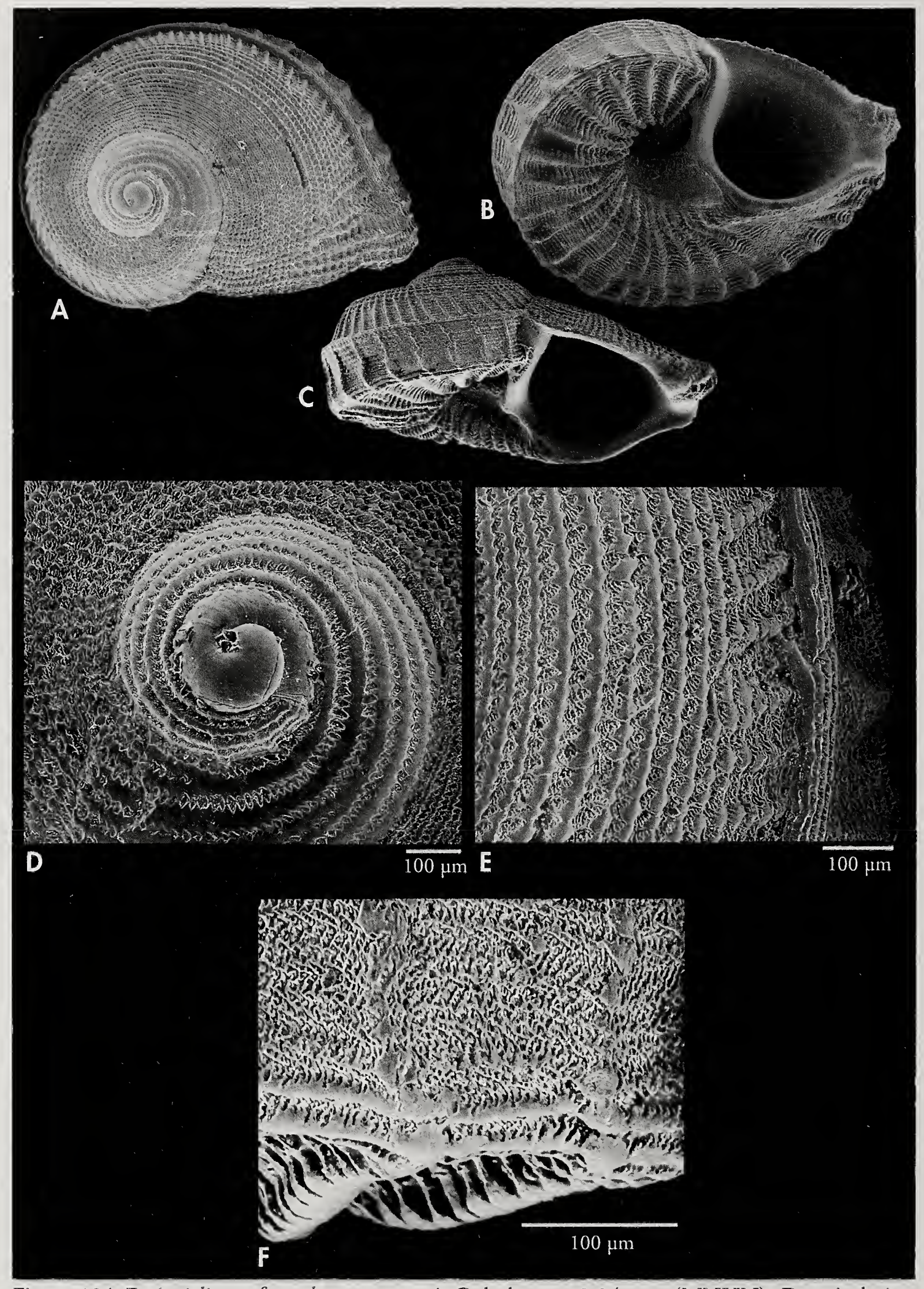


Figure 13A-F. *Anticlimax fecunda* spec. nov. A-C: holotype, 2.24 mm (MNHN); D: apical view and protoconch of the holotype; E-F: microsculpture, New Caledonia, Loyalty Islands, Baie du Santal, West-Southwest of Pointe d'Easo, Stn. 1430, 20-25 m, patches (called "patates") of coral close to a sedimentary passage.

Figura 13A-F. Anticlimax fecunda *spec. nov. A-C: holotipo, 2,24 mm (MNHN); D: visión apical y protoconcha del holotipo; E-F: microescultura, Nueva Caledonia, Iles Loyauté, Baie du Santal, Oeste-suroeste de Pointe d'Easo, Stn. 1430, 20-25 m, macizos (denominados "patates") de coral próximos a un paso sedimentario.*

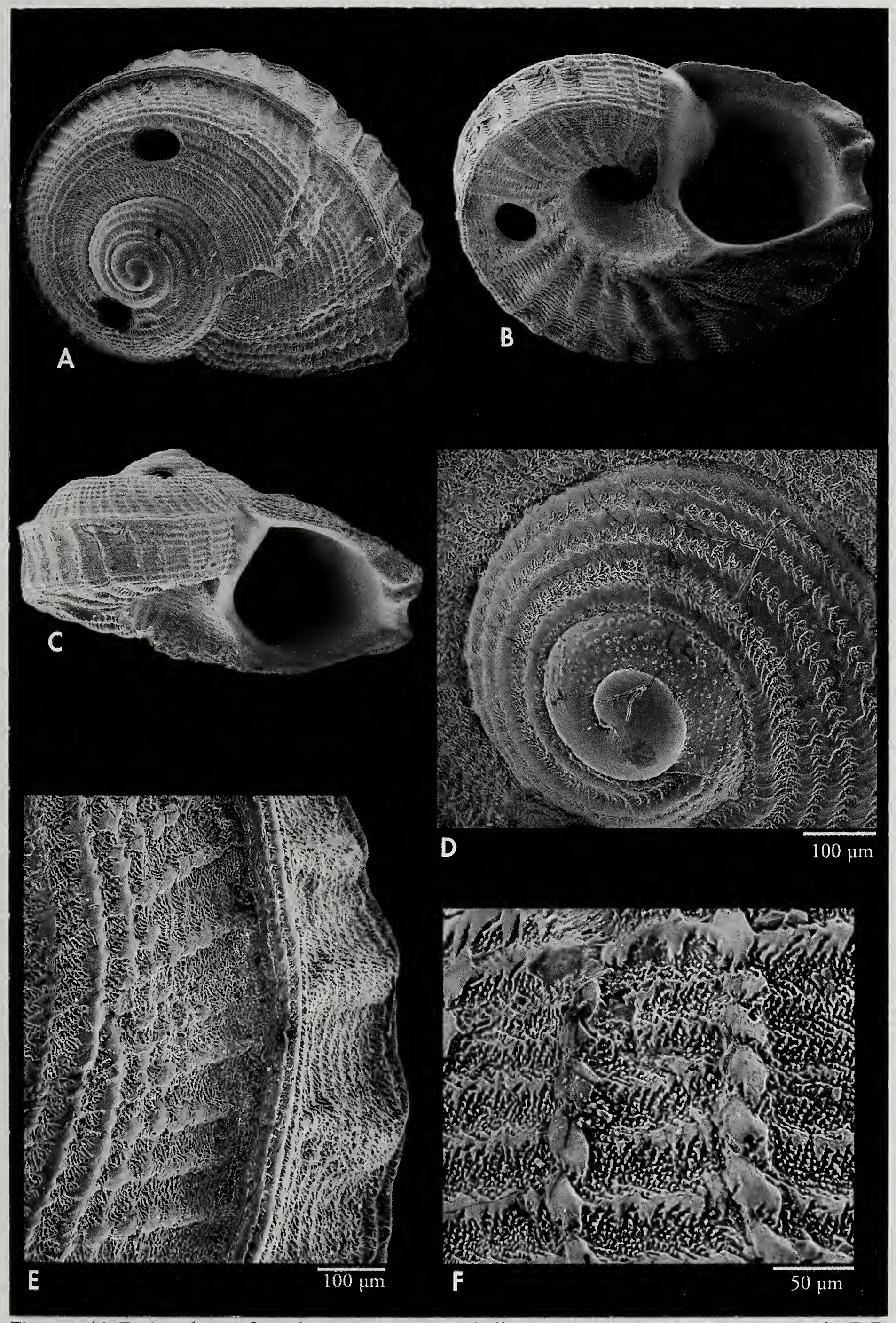


Figure 14A-F. *Anticlimax fecunda* spec. nov. A-C: shell, 1.93 mm MNHN; D: protoconch; E-F: microsculpture. Vanuatu, NW Tutuba Island, Stn. DS108, 100 m.
Figura 14A-F. Anticlimax fecunda *spec. nov. A-C: concha, 1,93 mm MNHN; D: protoconcha; E-F: microescultura. Vanuatu, NO de la isla Tutuba, Stn. DS108, 100 m.*

and two distinct phases, the first totally smooth and the second with some thick tubercles that are concentrated closer to the suture; it ends with a clear change of sculpture. The teleoconch has about 2 ¼ whorls, and two carinae, one peripheral and the other basal, which angle the shell which is completely covered by spiral cords, with thick axial ribs on the periphery and thick axial folds at the base. In the 1 ¼ first whorls there are 5 not very prominent spiral cords that develop in a zigzag pattern forming rhomboid cells in their interspaces; later the cords are multiplied, and at each point of intersection with the axial striae a small nodule is formed. In the spaces between cords microtubercles are not to be observed; instead there is a network of lines that criss-cross. On the adapical part, the spiral cords predominate, and appear as granular from the first whorl of the teleoconch due to the interference with axial striae. More than 25-30 may be observed on the last whorl. In the area close to the peripheral carina there are fine axial ribs that predominate on the spiral cords.

The space between the peripheral and the basal carinae is slightly concave and presents 7-10 fine spiral cords intersected by marked axial ribs. Base slightly convex, totally covered with fine spiral cordlets. There are 20-21 thick axial folds and a cord that limits and marks an angle with the umbilicus. Aperture triangular; parietal area covered by a thick callus; columella angled, very thick and reflected towards the umbilicus; outer lip thick, margin unchanged by the spiral cords, but modified by the peripheral carina expanding it laterally, forming two internal angles at the point of contact with the carina. Umbilicus wide and deep, delimited by 2 thick spiral cords; the cord located inside is definitely thickened near the inner lip and marks the beginning of the columella; the more external cord, located on the base, circumscribes the umbilicus, marks the end of the columella and is formed by the angulation of the axial folds. The umbilical wall is slightly concave and on it, a completely smooth area in the space between the cords is observed.

Dimensions: the holotype is 2.24 mm in diameter; the other shell studied is 1.93 mm.

Habitat: The holotype was collected in the infralittoral, living between 20-25 m, on a bottom of rounded corals (called "patates") close to an area of sediment. Conversely, the shell from Vanuatu was collected deeper, in the circalittoral, dredged at 100 m depth.

Remarks: The species is characterized by the lack of complete axial ribs on the adapical part; the shape of the aperture and the lateral expansion, due to the proximity of the peripheral carina; and the axial, peripheral and basal ribbing.

Anticlimax fecunda spec. nov. may be differentiated from *A. robusta* spec. nov. by the larger size of the protoconch and by lacking ornamentation on phase 1 of the protoconch.

From *Anticlimax infaceta* spec. nov., it is differentiated by the different ornamentation of phase 2 of the protoconch and by the lack of spirally aligned cells in the teleoconch.

Anticlimax robusta spec. nov. (Figures 4E, 15A-G)

Type material: Holotype MNHN 27179 (Figs. 04E, 15A).

Material examined: (3 s): Philippines, PANGLAO 2004: 1 s, Panglao Island, Napaling, Stn. S5, 9°37.1'N, 123°46.1'E, 2-4 m, rock and coral patches, brown algae (Figs. 15B-C); 1 s, Panglao Island, Pontod Islet, Stn. D4, 9°33.1'N, 123°44.0'E, 0-2 m, soft bottom with seagrass; 1 s, Balicasag Island, Black Forest, Stn. S3, 9°31.1'N, 123°41.3'E, 6 m, edge of reef platform (type material).

Type locality: Philippines, Balicasag Island, Black Forest, 9°31.1'N, 123°41.3'E, 6 m, edge of the reef platform [PANGLAO 2004: Stn. S3].

Etymology: The specific name is from *robustus, -a, -um,* "robust" as is shown by the sculpture of the shell.

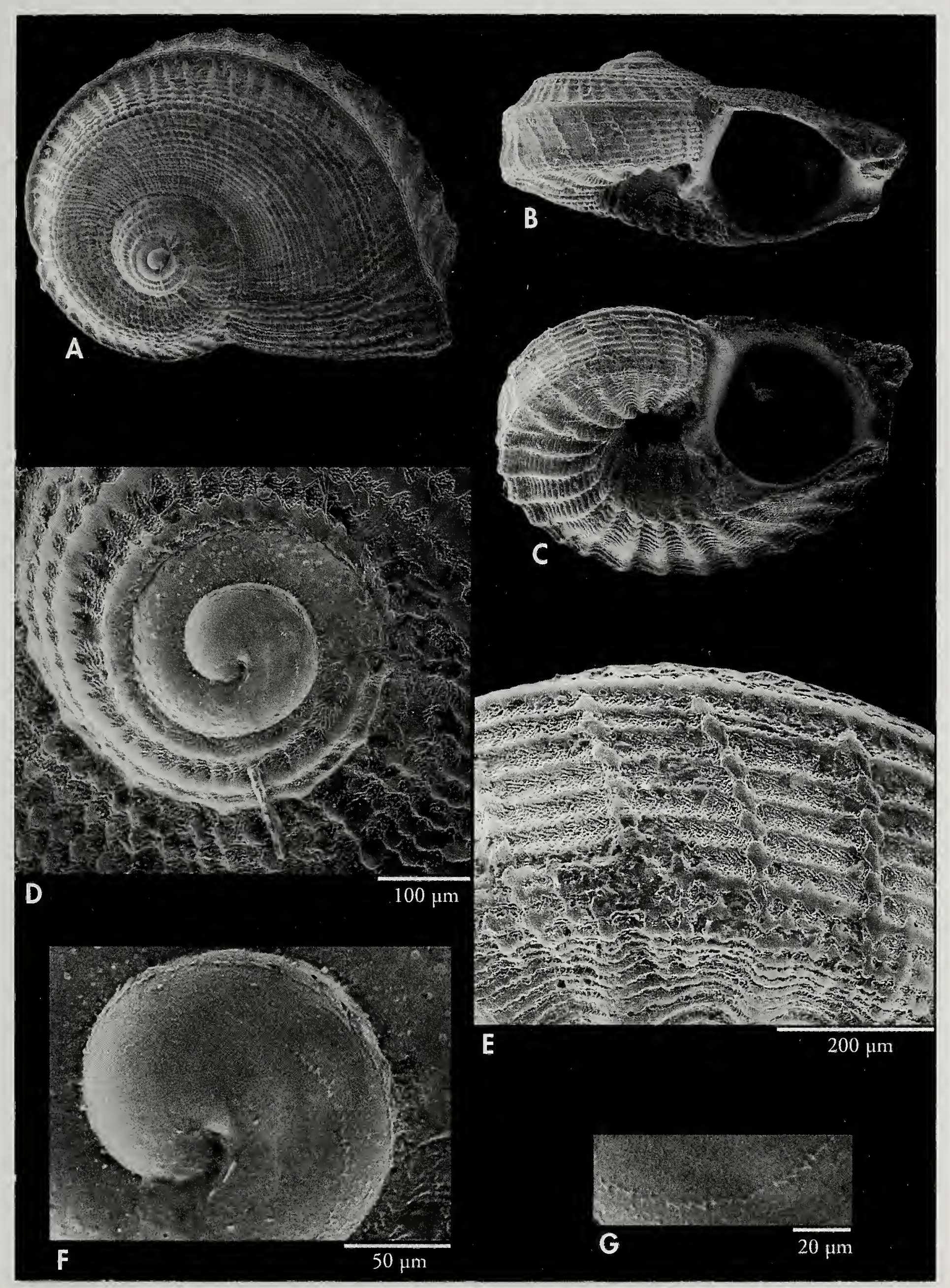


Figure 15A-G. *Anticlimax robusta* spec. nov. A: holotype, 2.46 mm, Philippines, Balicasag Island, Stn. S3, 6 m (MNHN); B-C: shell, 2.2 mm, Napaling, Panglao Island, Stn. S5, 2-4 m (MNHN); D: protoconch of the holotype; E: microsculpture of the holotype. F-G: detail of the microsculpture of the protoconch.

Figura 15A-G. Anticlimax robusta *spec. nov. A: holotipo, 2,46 mm, Filipinas, Isla de Balicasag, Stn. S3, 6 m (MNHN); B-C: concha, 2,2 mm, Napaling, Isla de Panglao, Stn. S5, 2-4 m (MNHN); D: protoconcha del holotipo; E: microescultura del holotipo. F-G: detalle de la microescultura de la protoconcha.*

Distribution: Only known from Panglao and Balicasag Islands, Philippines, between 2 and 6 m.

Description: Shell small (<2.5 mm), robust in appearance, formed by 3 ¾ quickly increasing whorls, with a moderately depressed spire, bicarinate, and with a wide and deep umbilicus.

The protoconch measures 270 μm, has 1 ½ whorls with two distinct phases, the first presenting, on a smooth background, 2 fine spiral cordlets formed by microtubercles; the second part has tubercles of different sizes scattered randomly; it ends with a sudden change of sculpture. The teleoconch has 2 ¼ whorls and is bounded by two carinae, one peripheral, the other basal; its surface is completely covered by spiral cords, with thick axial ribs on the periphery and thick axial folds at the base. The spiral cords show their interspaces covered by axial striae and aligned microtubercles that look like strands of a lattice, giving the impression of developing in zigzag.

On the adapical part spiral cords predominate which, by effect of the axial striae, appear as granular from the first whorl of the teleoconch and reaching more than 30 on the last spiral whorl; in the area near the peripheral carina fine axial ribs predominate over the spiral cords. The space between the peripheral and the basal carinae is slightly concave and presents 7 fine spiral cords intersected by marked axial ribs. Base is slightly convex, totally covered by fine spiral cordlets, there are 17 thick axial folds and a thick cord that limits and makes an angle with the umbilicus. Aperture oval; parietal area covered by a thick callus; columella straight, very thick, not reflected; outer lip thick-walled, margin remains unchanged by the spiral cords, but modified by the peripheral carinae which expand it laterally, forming two internal angles at the point of contact with the carinae.

Umbilicus wide and deep, limited by 2 thick spiral cords; the cord located inside, is widely thickened near the inner lip and marks the beginning of the columella; the more external cord, located on the base, circumscribes the umbilicus, marks the end of the columella and is formed by the angulations of the axial folds. The umbilical wall is more or less straight and on it more weak axial folds and spiral grooves can be observed.

Dimensions: the holotype is 2.46 mm in diameter.

Habitat: Infralittoral species dredged in 0-2 m, soft bottom with seagrass (Stn. D4); suctioned at 2-4 m, rock and coral patches, brown algae (Stn. S5) and at 6 m, at the edge of de reef platform (Stn. S3).

Remarks: *Anticlimax robusta* spec. nov. differs from *A. fecunda* spec. nov. by the smaller size of its protoconch which has 2 fine spiral cordlets on its first phase.

From *Anticlimax infaceta* spec. nov. it differs by the smaller diameter of the protoconch, the larger size and smaller number of tubercles of phase 2 and by presenting heavy axial ribs between the peripheral and the basal carinae.

Anticlimax infaceta spec. nov. (Figures 4F, 16A-G, 17A-B)

Type material: Holotype MNHN 27177 (Figs. 04F, 16A) and 2 paratypes MNHN 27178 (Figs. 17B-D).
Material examined: (3 s): Only from the type locality.
Type locality: Philippines, Bohol Island, Ubajan, 9°41.5'N, 123°51.0'E, 12 m, muddy bottom [PANGLAO 2004: Stn. S27].
Etymology: The specific name is from the Latin word *infacetus, -a, -um,* which means "insipid, tasteless", alluding to the scarce sculpture of the ventral part.

Distribution: Only known from the type locality at 12 m.

Description: Shell small, robust, formed by 4 whorls of rapid growth; two thick carinae angle the shell; umbilicus broad and deep.

The protoconch measures about 310 μm in diameter, has 1 ¾ whorls and two

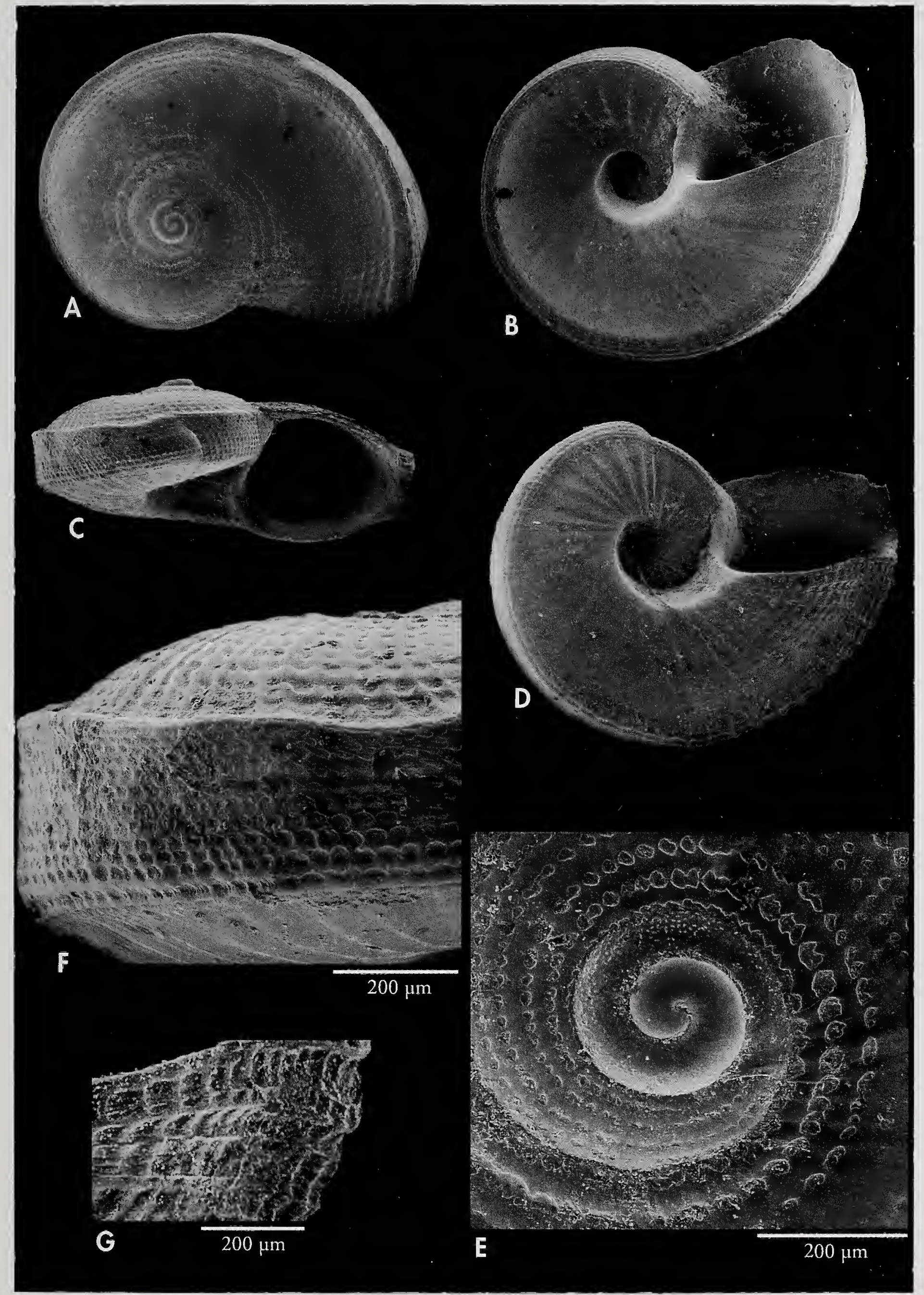


Figure 16A-G. *Anticlimax infaceta* spec. nov. A: holotype, 2.15 mm (MNHN); B: paratype, 1.8 mm (MNHN); C-D: paratype, 2.1 mm (MNHN); E: protoconch (holotype); F-G: microsculpture. Philippines, Panglao Island, Stn. S27, 12 m, mud bottom.

Figura 16A-G. Anticlimax infaceta *spec. nov. A: holotipo, 2,15 mm (MNHN); B: paratipo, 1,8 mm (MNHN); C-D: paratipo, 2,1 mm (MNHN); E: protoconcha (holotipo); F-G: microescultura. Filipinas, Isla de Panglao, Stn. S27, 12 m, fondo de fango.*

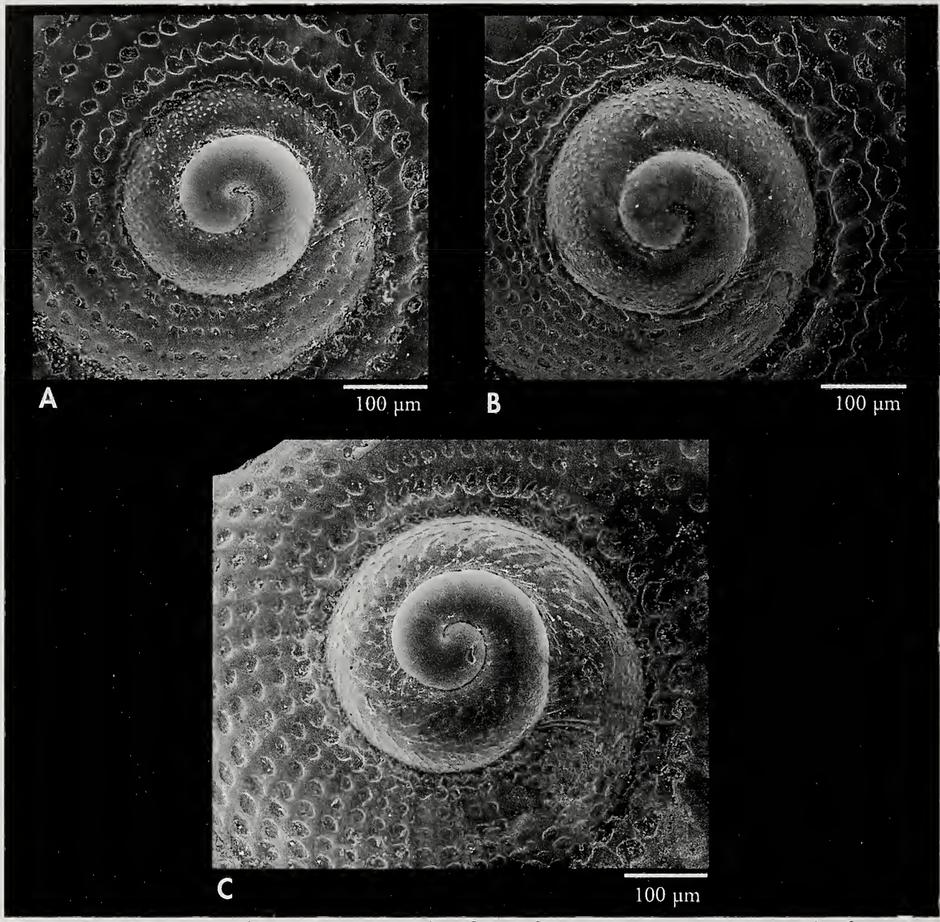


Figure 17A-C. Protoconchs. A-B: protoconchs of *A. infaceta* spec. nov. C: protoconch of *A. singularis* spec. nov.

Figura 17A-C. Protoconchas. A-B: protoconchas de A. infaceta *spec. nov. C: protoconcha de* A. singularis *spec. nov.*

distinct phases; the first is completely smooth and the second has fine small tubercles scattered over the whole surface; it ends in a slight thickening. The teleoconch has two spiral whorls and is delimited by two carinae, one being peripheral, the other, basal; ornamentation formed by flattened spiral cords and sinuous axial lines that intersect to form in their interspaces lines of rounded cells covering the adapical part and the periphery of the shell. On the adapical part of the last whorl the cords disappear over a wide strip, which appears to be almost smooth.

Base convex, observed at the beginning of last whorl, with thick axial ribs that disappear in some areas from the first quarter whorl, leaving only fine growth lines; a thin cord defines and angles the umbilicus. Aperture triangular, oval; parietal area covered by a thin callous coating; columella arched, very thick, reflected towards the umbilicus but not occluding it entirely; outer lip thick-walled, margin unchanged by the spiral cords, but modified by the peripheral carina expanding it laterally, forming two internal angles at the point of contact with the carina. Umbilicus

wide and deep, with an angled edge and straight wall, on which there are fine spiral cordlets and some axial folds.

Dimensions: the holotype is 2.15 mm in maximum diameter.

Habitat: Infralittoral species collected at 12 m, on a muddy bottom.

Remarks: *Anticlimax infaceta* spec. nov. differs from the remaining species of the group by its size and the ornamentation of the protoconch; by lacking axial ribs between the peripheral and basal carinae and also by lacking thick axial folds at its base; the outer lip is not so angled or as thick as in other species.

Anticlimax bicornis spec. nov. (Figures 4G, 18A-F)

Type material: Holotype MNHN 27129 (Figs. 04G, 18A-C).
Material examined: Only from the type locality.
Type locality: Solomon Islands, 8°40'S, 160°04'E, 396-411 m [SALOMON 1: Stn. DW1762].
Etymology: The specific name alludes to the two horn like prominences in the aperture.

Distribution: Only known from Solomon Islands, between 396-411 m.

Description: Shell small (< 2 mm), robust, bicarinate, formed by 3 ¾ whorls separated by a faint suture, with a rather low spire and widely umbilicate.

The protoconch is large in relation to the dimensions of the shell (about 25%), with a little more than 2 whorls and about 380 μm in diameter; it has 2 parts, the first (1 ¼ whorls) completely smooth, and the second (¾ of whorl) covered by axial growth lines, more evident along the suture and with randomly distributed tubercles; the termination is evident by the change in sculpture of the teleoconch. This has 1 ½ whorls and 2 strong peripheral carinae which angle the shell. Adapical part convex, covered completely by spiral cords that develop in zigzag; periphery somewhat concave, covered by spiral cords also in zigzag, but without folds or axial ribs. Base convex delimited by the peripheral carina, completely smooth except close to the carina and showing a broad umbilicus which allows the previous whorls to be seen. Aperture rounded, prosocline; parietal area callous with a thick layer; columella arched, reflected outward but without forming callus; outer lip not modified by spiral cords, but the peripheral carina angles and expands it laterally. Very wide umbilicus, inside which there are marked growth lines and, on the deeper umbilical wall area 3-4 spiral cordlets.

Dimensions: the holotype is 1.66 mm in diameter.

Habitat: Bathyal species, dredged at 396-411 m depth on the slope.

Remarks: The species is characterized by the size and decoration of the protoconch, formed by randomly distributed micro-tubercles; the characteristic spiral cords in zigzag; the concave periphery with ribs without axial folds; the base lacking spiral cords and a wide umbilicus with fine cordlets inside.

Most of the species of its group have peripheral prominences: the most similar is *Anticlimax singularis* spec. nov., but this species has only one prominence on the external lip and the protoconch has a distinctive microsculpture.

Anticlimax singularis spec. nov. (Figures 4H, 17C, 19A-G)

Type material: Holotype MNHN 27195 (Figs. 4H, 19A-B).
Material examined: Only from the type locality.
Type locality: Philippines, Bohol Island, Cortes, 9°43.3'N, 123°48.8'E, 126-135 m, in mud bottom [PANGLAO 2004: Stn. T26].
Etymology: The specific name is due to the very strange sculpture of the protoconch, different from all other species in the family.

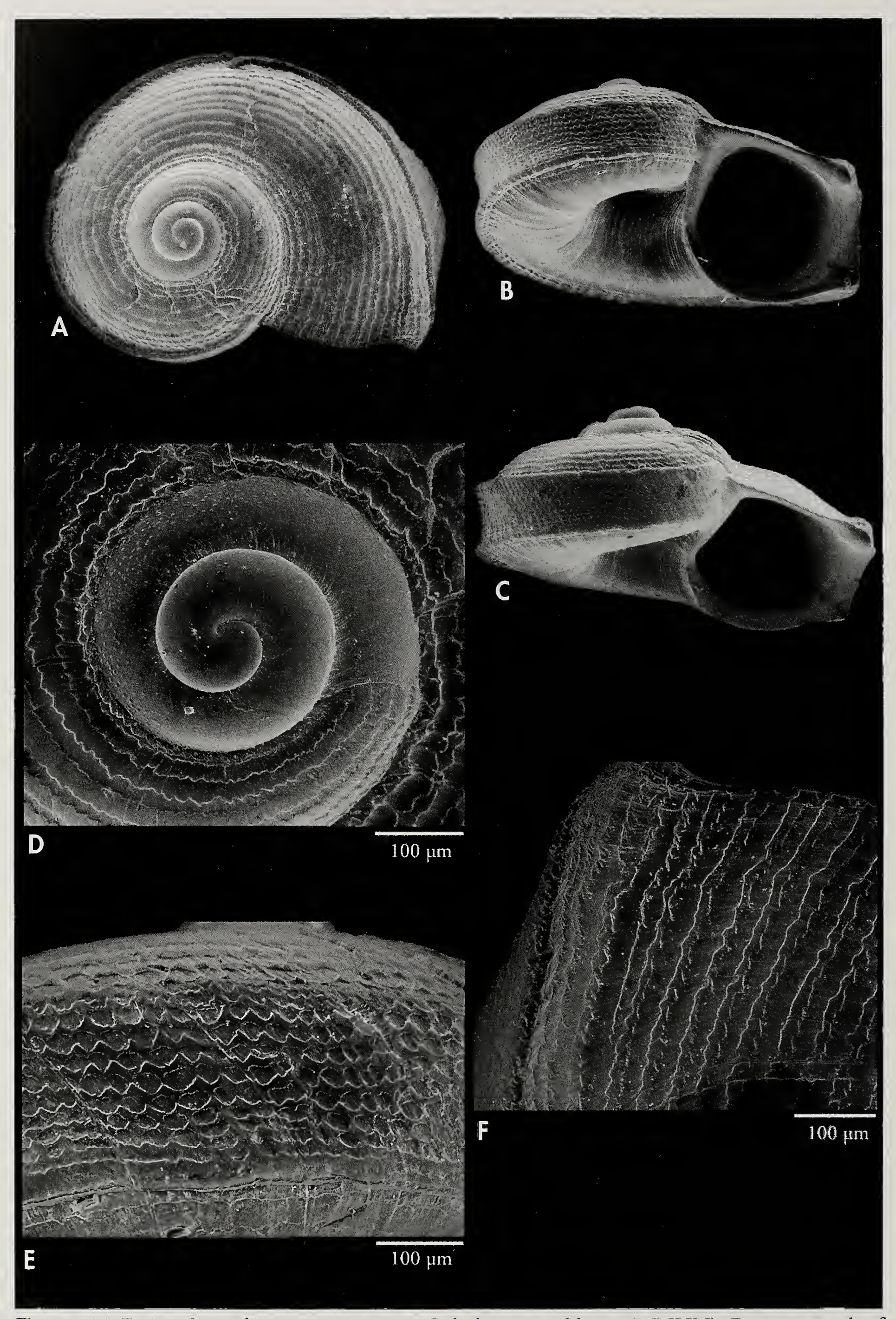


Figure 18A-F. *Anticlimax bicornis* spec. nov. A-C: holotype, 1.66 mm (MNHN): D: protoconch of the holotype; E-F: microsculpture. Solomon Islands, Stn. DW1762, 396-411 m.
Figura 18A-F. Anticlimax bicornis *spec. nov. A-C: holotipo, 1.66 mm (MNHN): D: protoconcha del holotipo; E-F: microescultura. Islas Salomón, Stn. DW1762, 396-411 m.*

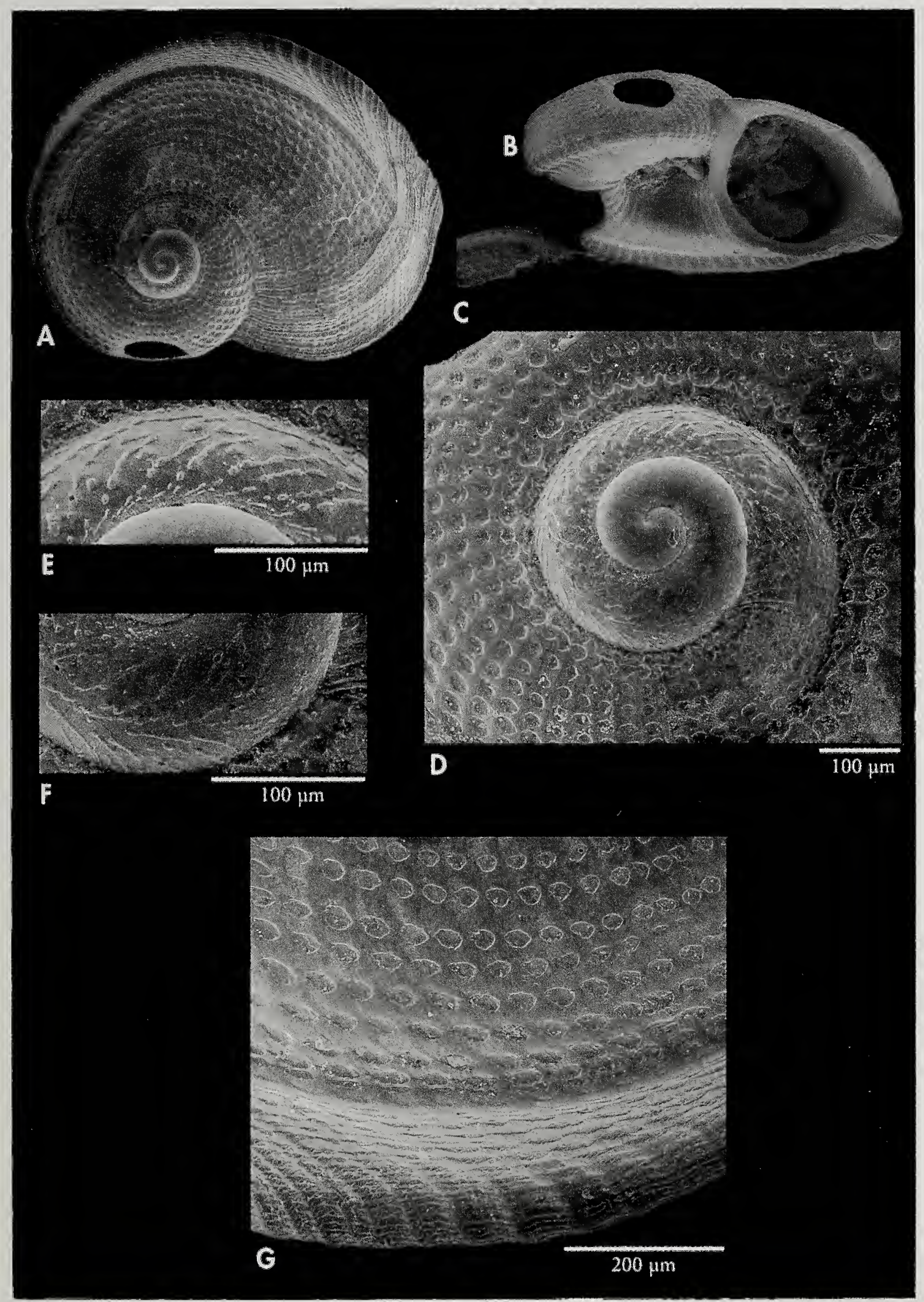


Figure 19A-G. *Anticlimax singularis* spec. nov. A-B: holotype, 1.66 mm (MNHN): C: fragment of the holotype; D: protoconch of the holotype, same as fig. 17C; E-F: microsculpture of the protoconch; D: microsculpture of the teleoconch. Philippines, Bohol Island, Stn. T26, 126-135 m.
Figura 19A-G. Anticlimax singularis *spec. nov. A-B: holotipo, 1,66 mm (MNHN): C: fragmento del holotipo; D: protoconcha del holotipo, la misma de la fig. 17C; E-F: microescultura de la protoconcha; D: microescultura de la teleoconcha. Filipinas, Isla de Bohol, Stn. T26, 126-135 m.*

Distribution: Only known from the Philippines, Panglao 2004, between 126-135 m.

Description: Shell small (<2 mm), wider than high, formed by 3 ½ whorls separated by a slightly marked suture, with a low spire, widely umbilicate.

The protoconch has a little more than 2 whorls, measures about 390 µm in diameter and has three distinct phases: the first one (nucleus and ½ whorl) is completely smooth; a second phase of about ½ whorl is also smooth; the third increases a little the diameter and is completely covered by oblique, orderly lines in variable position; a few growth lines at the end. The teleoconch has just 1 ½ whorls and 2 carinae, one peripheral, the other basal; the peripheral disappears in the last quarter and the basal is the most prominent of the two.

The ornamentation is composed of flattened spiral cords, ribs and axial folds; there are rounded cells in the interspaces between cords. On the adapical part, the spiral cords develop in zigzag; 7 cords at the beginning of the teleoconch, increasing to 20-22 in the last quarter-whorl, can be observed between the peripheral carina and the suture; no nodulose cordlets are present but in the last quarter-whorl axial ribs become more evident. The space between the carinae has 10 spiral cordlets in zigzag and rounded cells in the interspaces, seen in an apertural position; in the last half whorl more than 40 fine axial ribs, most evident over the basal carina, but not forming folds, can be counted. Spire and base convex, the space between the carinae slightly concave. Base with evident axial folds that extend from the basal carina towards the umbilicus, penetrating inside; at the beginning there are some wide and flattened spiral cords intersected by weak axial folds.

Aperture triangular; parietal area covered by a thick callous coating; columella arched and reflected towards the umbilicus; adapical part of outer lip not modified by the termination of spiral cords; unique angle on lip which corresponds to the basal carina and expands the aperture laterally. Umbilicus wide and deep, allowing the previous whorls to be seen, not limited by a carina; umbilical wall convex, smooth, with weak axial folds.

Dimensions: the holotype is 1.66 mm in diameter.

Habitat: Bathyal species trawled at 126-135 m, on a muddy bottom (Stn. T26).

Remarks: The holotype was broken in two pieces during study but there remains enough to represent the species mainly because of the very uncommon sculpture of the protoconch and so it is maintained.

The species is characterized by: the decoration of the third phase of the protoconch; the presence of rounded cells in the spaces between the cords and the carinae of the adapical part; the absence of nodules on the cords; the triangular aperture and the presence of a unique angle inside the outer lip; the absence of axial folds between the peripheral and basal carinae.

The existence of three different periods or phases in protoconch development is not common and we have no explanation for them. In the present species they seem to be very evident in the protoconch scars and sculpture.

Anticlimax puncticulata spec. nov. (Figures 4I, 20A-F)

Type material: Holotype MNHN 27224 (Figs. 4I, 20A) and 3 paratypes MNHN 27225 (Figs. 20B-D).

Material examined: (4 s): Only from the type locality.

Type locality: Philippines, Bohol Island, Cortes, 9°41.8'N, 123°49.9'E, 80-100 m, reef slope with silt [PANGLAO 2004: Stn. T18].

Etymology: The specific name alludes to the "micropunctate" aspect of the shell.

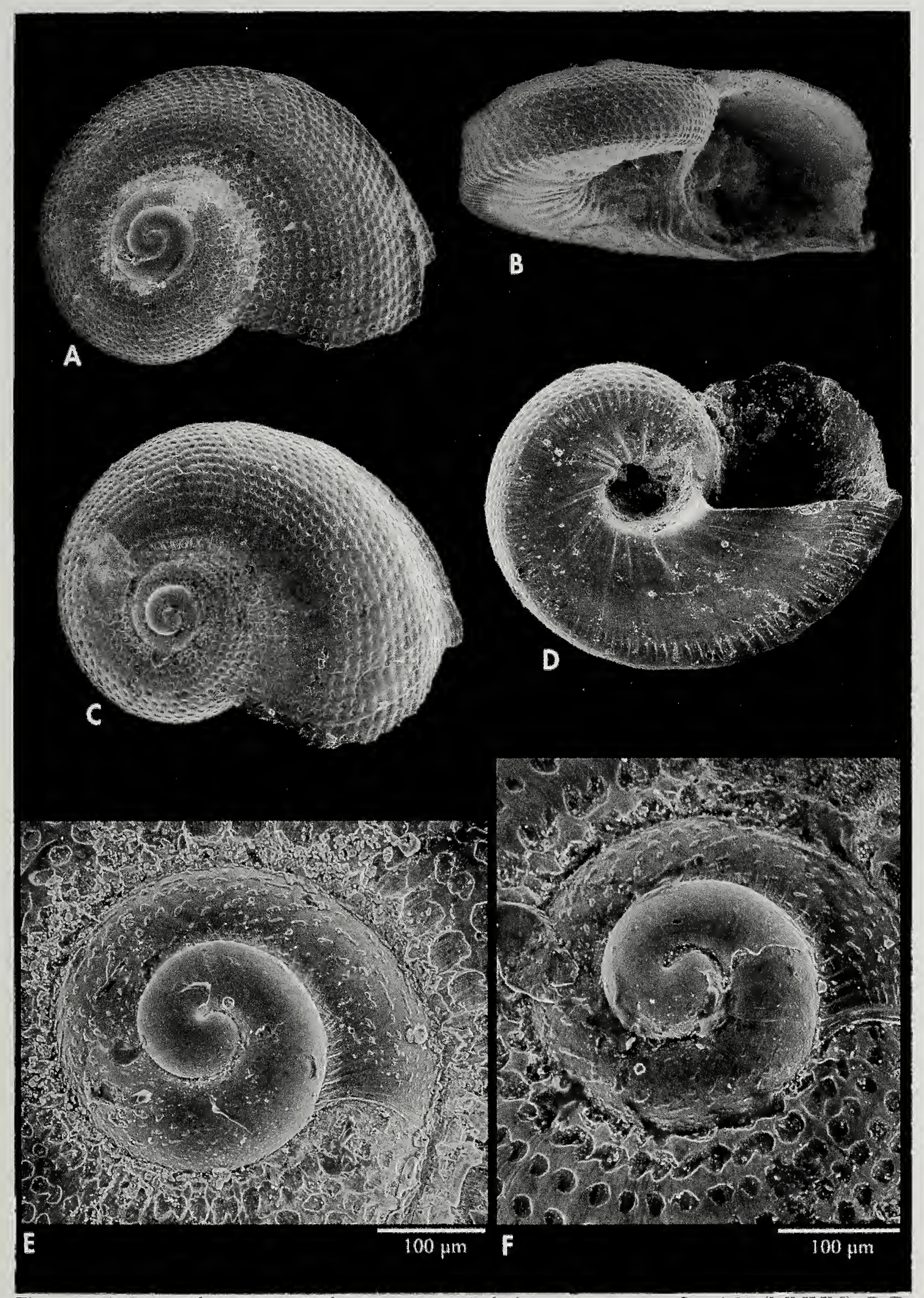


Figure 20A-F. *Anticlimax puncticulata* spec. nov. A: holotype, 1.29 mm Stn A53 (MNHN): B-D: paratype 1.37, 1.5 mm (MNHN); E-F: protoconchs from the paratypes. Philippines, Bohol Island, Cortes, Stn. T18, 80-100 m.

Figura 20A-F. Anticlimax puncticulata *spec. nov. A: holotipo, 1,29 mm Stn A53 (MNHN): B-D: paratipos 1,37, 1,5 mm (MNHN); E-F: protoconchas de los paratipos. Filipinas, Isla de Bohol, Cortes, Stn. T18, 80-100 m.*

Distribution: Only known from the Philippines, Bohol Island, Cortes, Stn. T18, 80-100 m.

Description: Shell very small (<1.5 mm), wider than high, formed by 3 ¼ whorls separated by a slightly marked suture, with a low spire, widely umbilicate.

The protoconch has 2 whorls, measuring 340-370 μm in diameter and has three distinct phases, the first phase and the second phase, of about a half whorl, are completely smooth; then appears a third phase that is covered by small, regularly distributed, elongated tubercles. The teleoconch has 1 ¼ whorl and 2 carinae; the basal carina is the more prominent, while the peripheral, which develops in the last half whorl, may disappear in some specimens.

The ornamentation is composed of flattened spiral cords, axial ribs and rounded cells in the spaces between the cords. On the adapical part, the spiral cords develop in zigzag, 4-5 cords can be observed at the beginning of the teleoconch and 15-16 on the last quarter-whorl between the peripheral carina and the suture; no nodulose cordlets are apparent, while in the last quarter-whorl the axial ribs become more evident. The space between the carinae has 5-6 spiral cordlets in zigzag and rounded cells in their interspaces, seen in an apertural position; in general, the peripheral carina is scarcely developed: in some specimens it may be observed on the last quarter-whorl and in others it hardly shows at all. Profile with a convex spire and the space between the carinae straight or slightly concave. Base almost flat, with evident axial ribs that extend from the basal keel towards the umbilicus, penetrating inside.

Aperture quadrangular, very wide; parietal area with a marked angle and a thin layer of callus that barely covers it; columella arched, thickened at the base and reflected towards the umbilicus, forming thick folds on it; the adapical part of outer lip not modified by the termination of spiral cords; the outer lip shows a single angle which corresponds to the basal carina and expands the aperture laterally. The height and width of the umbilicus allow the previous whorls to be seen and the umbilical wall is convex, with strong axial folds.

Dimensions: the holotype is 1.29 mm in diameter. The largest shell measures 1.50 mm in diameter.

Habitat: Circalittoral species trawled at 80-100 m, on a muddy bottom with sponges (Stn. T18).

Remarks: *Anticlimax puncticulata* spec. nov. is characterized by the ornamentation of the third phase of the protoconch, intermediate between *A. infaceta* and *A. singularis*; the presence of rounded cells in the spaces between the adapical cords and the periphery; the absence of nodules on the cords; the presence or absence in the last quarter of the whorl of a peripheral carina; the large apertural square with a unique angle in the inner part of the outer lip; the absence of marked axial folds between the peripheral and basal carinae; the axial costulation on its base and inside the umbilicus.

As in *Anticlimax infaceta, A. singularis, A. bicornis, A. bicarinata* and *A. fijiensis,* there are three different periods or phases in the protoconch development of *Anticlimax puncticulata.* This is not a common situation and we have no explanation for it. In the present species it is very evident in the protoconch scars and sculpture.

Anticlimax bicarinata spec. nov. (Figures 5A, 21A-F)

Type material: Holotype MNHN 27121 (Figs. 5A, 21A-C).
Material examined: Only from the type locality.
Type locality: Vanuatu, 15°40'S, 167°20'E, 622-625 m [MUSORSTOM 8: Stn. DW1072].
Etymology: The specific name alludes to the presence of the two peripheral carinae in the last whorl.

Distribution: Only known from Vanuatu, between 622-625 m.

Description: Shell very small (<1.5 mm), depressed, bicarinate and widely

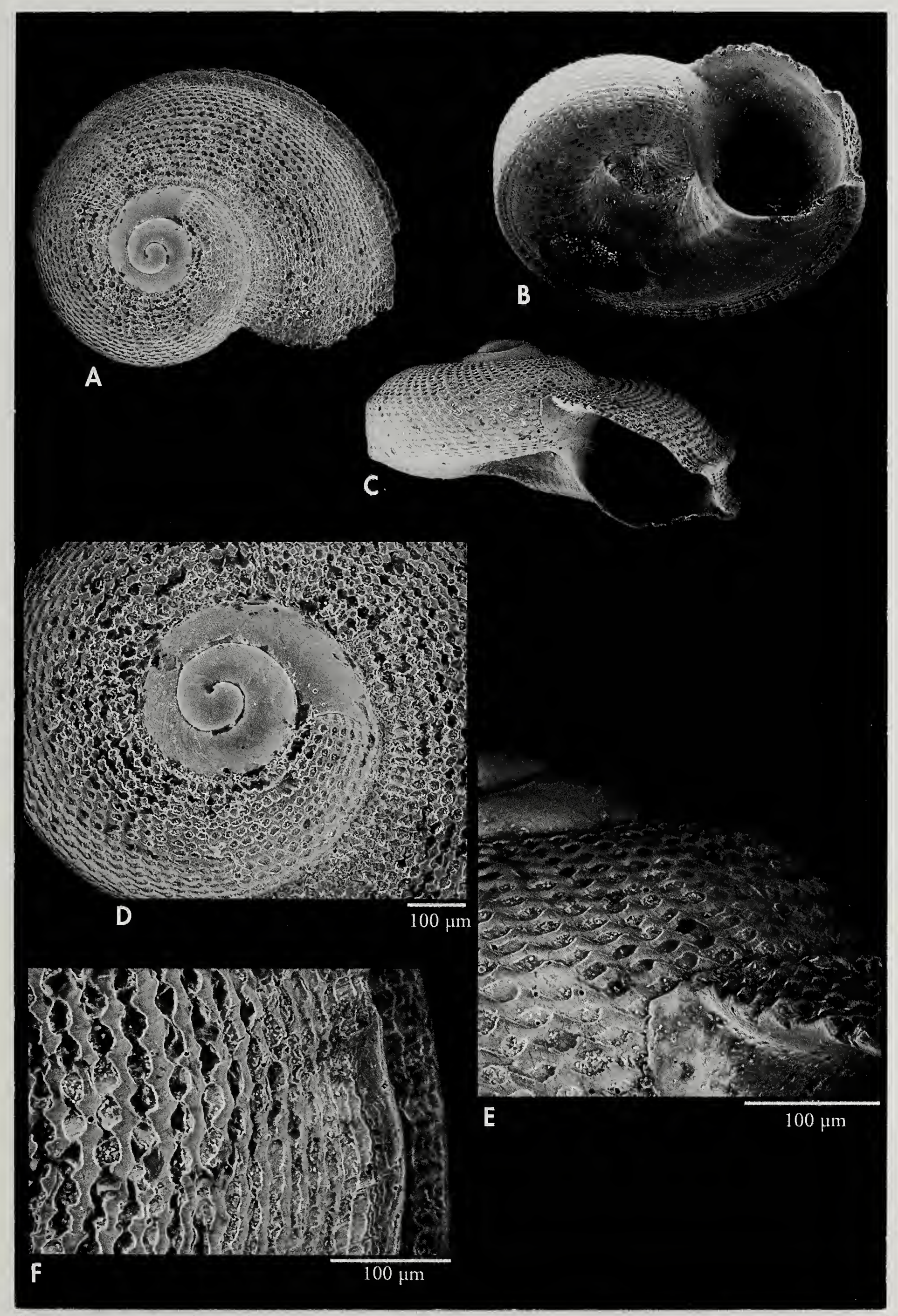


Figure 21A-F. *Anticlimax bicarinata* spec. nov. A-C: holotype, 1.3 mm MNHN; D: protoconch of the holotype; E-F: microsculpture. Vanuatu, MUSORSTOM 8: Stn. DW1072, 622-625 m.
Figura 21A-F. Anticlimax bicarinata *spec. nov. A-C: holotipo, 1,3 mm MNHN; D: protoconcha del holotipo; E-F: microescultura. Vanuatu, MUSORSTOM 8: Stn. DW1072, 622-625 m.*

umbilicate; formed by about 3 ¼ whorls of rapid growth.

Protoconch large in relation to the size of the shell, about 400 μm in diameter, having about 2 whorls; it is apparently smooth in the first 1 ½ whorls, and the remaining granulose part has very small tubercles and terminates with a change when the new sculpture of the teleoconch begins. Teleoconch with 1 ¼ whorls, having two peripheral carinae located respectively near the adapical part of the shell and delimiting the base; straight edge. The whole teleoconch is covered by spiral cords of regular size, which develop in zigzag and are crossed by thick axial growth lines that make up a typical reticule.

Profile with spire and base convex, periphery flat. At the base, the spiral cords are more flattened and less prominent, disappearing when they reach the last quarter of whorl. Aperture oval, prosocline; parietal area covered by a thin callous coating; columella slightly tilted, not thickened or reflected towards the umbilicus; outer lip with smooth margin, modified and expanded laterally by the presence of carinae, which form two angles internally. Umbilicus wide, allowing the previous whorls to be seen, delimited by a thin carina which angles it; on its inner wall only fine growth lines can be observed.

Dimensions: the holotype is 1.3 mm in diameter.

Habitat: Bathyal species dredged at 622-625 m.

Remarks: This species is characterized by the large protoconch (>400 μm diameter) in relation to the diameter of the shell (31%); the shape and location of the peripheral carinae; the reticulum formed by cords in zigzag and axial growth lines; the umbilicus is wide and limited by a thin carina.

Anticlimax fijiensis spec. nov. has a very different profile with two more prominent carinae (see below).

Anticlimax fijiensis spec. nov. (Figures 5B, 22A-F, 23A-F)

Type material: Holotype MNHN (27122, Figs. 5B, 22A-B) and one paratype MNHN 27123 (Fig. 22C) from the type locality; another paratype MNHN 27124 (Figs. 23A-C) from Stn. DW1334, 251-257 m.

Material examined: (3 s): Fiji, MUSORSTOM 10: 2 s, Stn. DW1333, 16°50'S, 178°12'E, 200-215 m (type material); 1 s, Stn. DW1334, 16°51'S, 178°14'E, 251-257 m (paratype).

Type locality: Fiji, 16°50.36'S, 178°12.55'E, 200-215 m [MUSORSTOM 10: Stn. DW1333].

Etymology: The specific name is that of the archipelago where the species was collected.

Distribution: Only known from Fiji, its type locality, Stn. DW1334 and DW1333.

Description: Shell small (<2.0 mm), of flattened aspect, bicarinate and widely umbilicate; formed by 4 whorls of quick growth.

The protoconch has more than 1 ¾ whorls (almost 2), placed at a slightly higher level than the teleoconch, measuring 340 μm in diameter and having two distinct phases; the first is completely smooth and the second is completely covered by a grainy surface of regular size; there is no labial varix. Teleoconch with just 1 ¾ whorls, bicarinate with two small keels, one peripheral and the other basal, the latter most expanding the circumference of the shell. Ornamentation formed by spiral cords in zigzag, axial ribs and cells of different shape in the interspaces between cords.

On the adapical part, initially 5 zigzagging spiral cords can be observed that cross with axial striae to form rounded cells in the interspaces between the cords; on the last whorl the cords, numbering 23 between suture and peripheral keel, have small granules that give a characteristic appearance. The space between the keels is concave and on it the spiral cords are crossed by

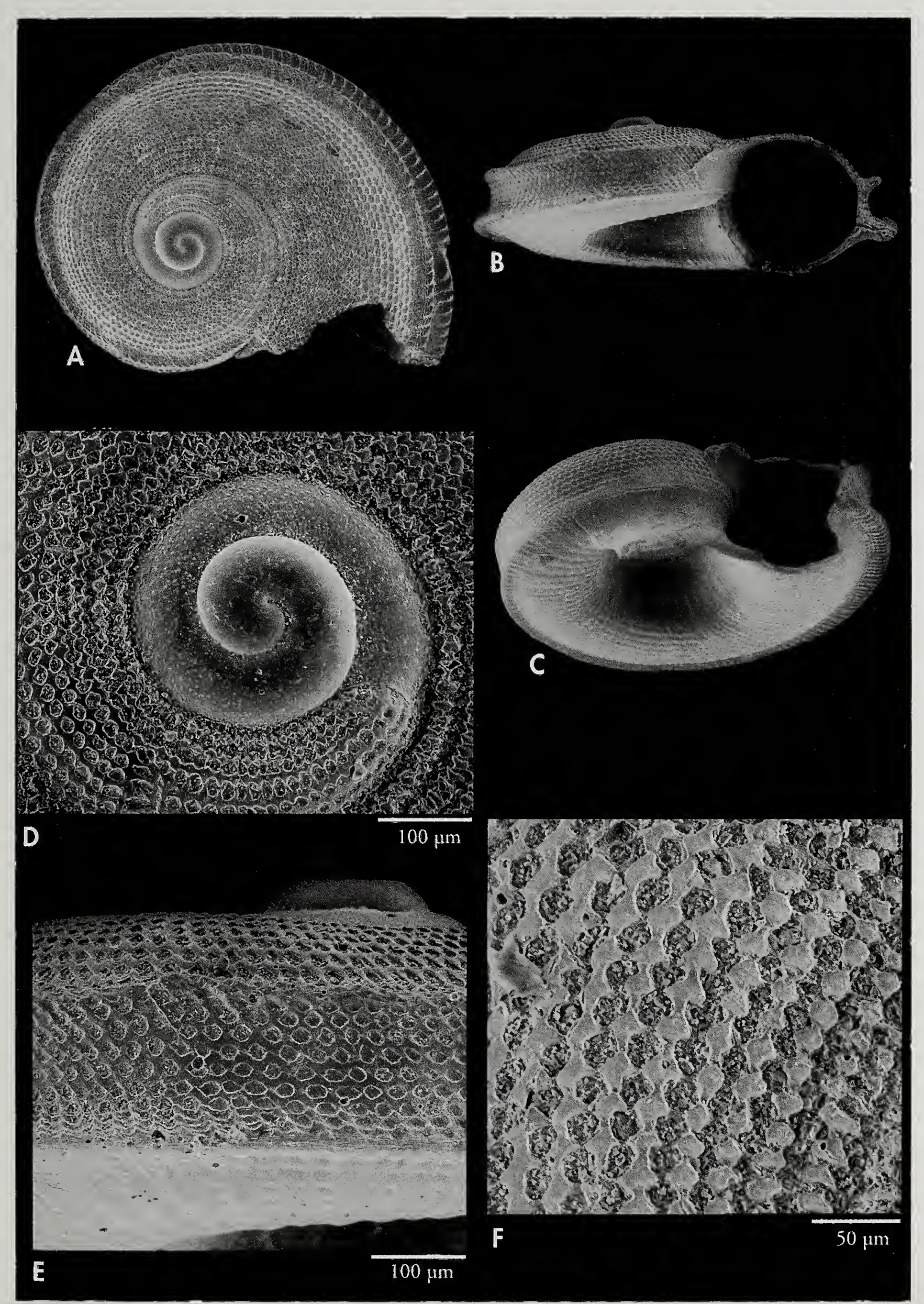


Figure 22A-F. *Anticlimax fijiensis* spec. nov. A-B: holotype, 1.64 mm MNHN; C: paratype, 1.6 mm (MNHN); D: protoconch of the holotype; E-F: microsculpture. Fiji, MUSORSTOM 10: Stn. DW1333, 200-215 m.

Figura 22A-F. Anticlimax fijiensis *spec. nov. A-B: holotipo, 1,64 mm MNHN; C: paratipo, 1,6 mm (MNHN); D: protoconcha del holotipo; E-F: microescultura. Fiyi, MUSORSTOM 10: Stn. DW1333, 200-215 m.*

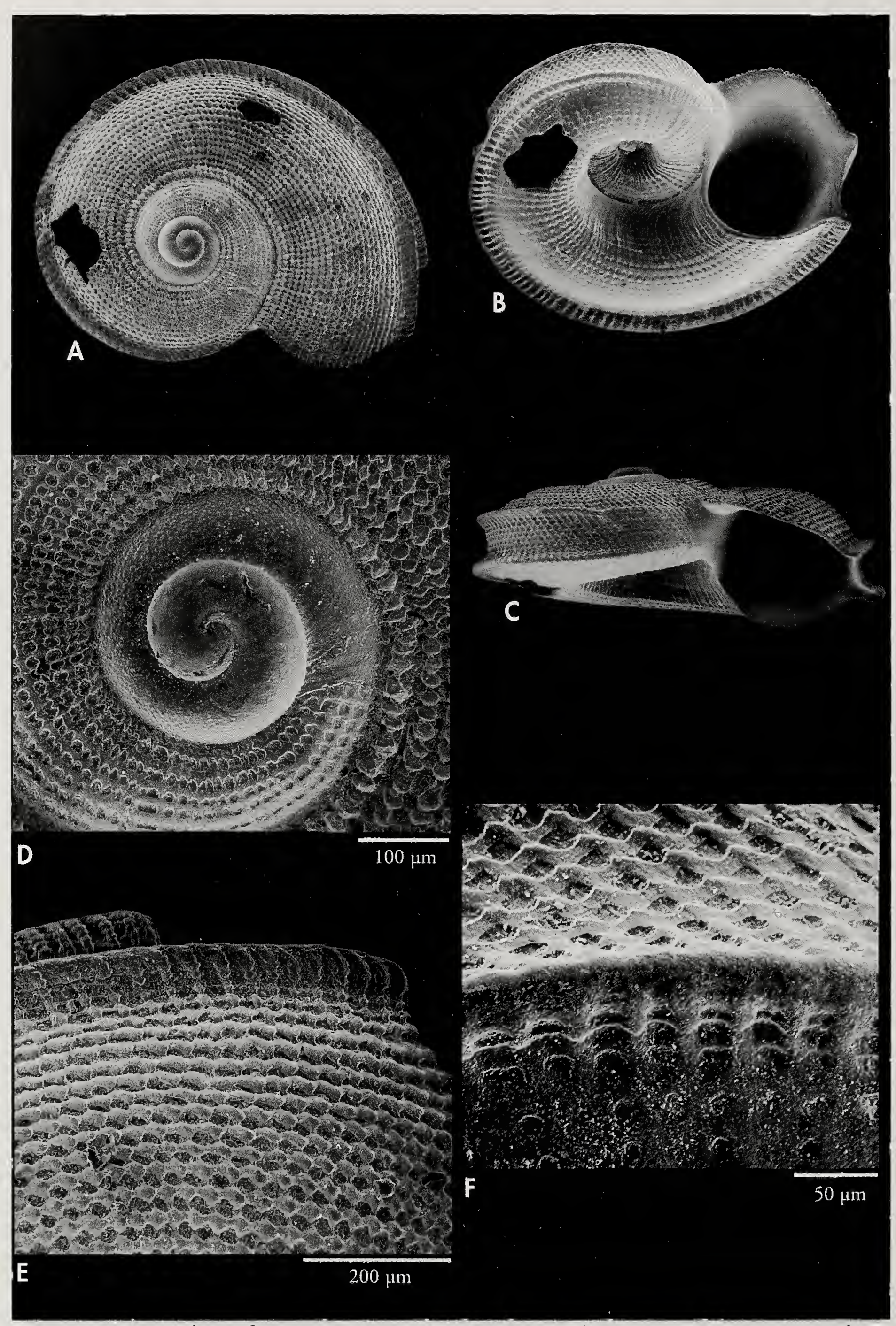


Figure 23A-F. *Anticlimax fijiensis* spec. nov. A-C: paratype, 1.76 mm MNHN; D: protoconch; E-F: microsculpture. Fiji, MUSORSTOM 10: Stn. DW1334, 251-257 m.
Figura 23A-F. Anticlimax fijiensis *spec. nov. A-C: paratipo, 1,76 mm MNHN; D: protoconcha; E-F: microescultura. Fiyi, MUSORSTOM 10: Stn. DW1334, 251-257 m.*

fine sinuous axial ribs, forming cells in the interspaces.

Base convex, with axial ribs that extend from the basal keel on the edge of the umbilicus and rounded cells over its entire surface. Umbilicus wide and deep, allowing the previous whorls to be seen; on the umbilical wall there are some spiral cordlets and marked growth lines. Aperture triangular, outer lip expanded laterally, with two internal angles corresponding to the carinae; parietal area covered by a thin callous coating; columella arched, thin-edged, not reflected.

Dimensions: the holotype measures 1.64 mm in maximum diameter.

Habitat: Bathyal species dredged at 200-257 m.

Remarks: The characters of this species which allow us to distinguish it from other species of its group are the fine granulation of the end of the protoconch and the concavity of the space between the two carinae. From *Anticlimax reinaudi* spec. nov. it also differs in lacking axial folds on the space between the carinae. *A. bicarinata* spec. nov. differs in having a flatter spire and in the greater prominence of its carinae.

Anticlimax maranii spec. nov. (Figures 2B-E, 5C, 24A-F, 25A-H)

Type material: Holotype MNHN 27132 (Figs. 5C, 24A-C).

Material examined: (2 spms, 1 s): Philippines, PANGLAO 2004: 1 s, Panglao Island, Napaling, Stn. B9, 8-10 m, caves in the reef wall (type material); 1 spm, Panglao Island, Doljo Point, Stn. B12, 9°35.6'N, 123°43.2'E, 24-27 m, reef slope; 1 spm, Panglao Island, Napaling, Stn. B21, 9°37.2'N, 123°46.4'E, 20-21 m, reef wall with small caves (Fig. 25).

Type locality: Panglao Island, Napaling, Philippines, 9°33.1'N, 123°44.0'E, 8-10 m, caves in the reef wall [PANGLAO 2004: Stn. B9].

Etymology: This species is named after Gilberto Marani, informatics technician in the MNHN malacology group, in recognition to his behind-the-scene contribution for maps, tables and graphs in many malacological papers.

Distribution: Only known from Panglao Island, Philippines, between 10 and 24 m.

Description: Shell small (<2 mm), wider than high, formed by 3 ½ whorls separated by an indistinct suture, with a low spire, widely umbilicate.

The protoconch has 1 ¾ whorls, measuring about 330 µm in diameter and with two distinct phases, the first one being completely smooth while the second phase is covered by a comma-shaped sculpture; there is no thickening. The teleoconch has 1 ¾ whorls and 3 carinae, one peripheral, one basal and one periumbilical. The ornamentation is composed of spiral cords, ribs, axial folds and rounded cells in the spaces between the cords.

On the adapical part, the spiral cords cross the axial striae, with 5-6 cords developed in zigzag on the first spire whorl; in the last ½ whorl, about 15 nodulose cordlets can be seen.

The space between the carinae has 15 spiral cordlets, viewed in an apertural position; on the last whorl more than 40 axial folds can be counted. Dorsum and base are convex, the spaces between carinae are concave. Base with a smooth wide area near the basal carina and 5-6 wide and narrow spiral cords intersected by weak axial folds; a third periumbilical carina angles and limits the umbilicus.

Aperture quadrangular; parietal area covered by a thick callous coating; columella arched and reflected towards the umbilicus; adapical part of the outer lip is crenulated externally by the termination of the spiral cords; in the periphery there are two angles that correspond to each of the carinae; the larger angle corresponds to the basal carina and expands the aperture laterally. Umbilicus wide and deep, allowing the previous whorls to be seen, limited by a carina which angles it; umbilical wall convex, smooth, with growth lines.

Dimensions: the holotype is 1.80 mm in diameter.

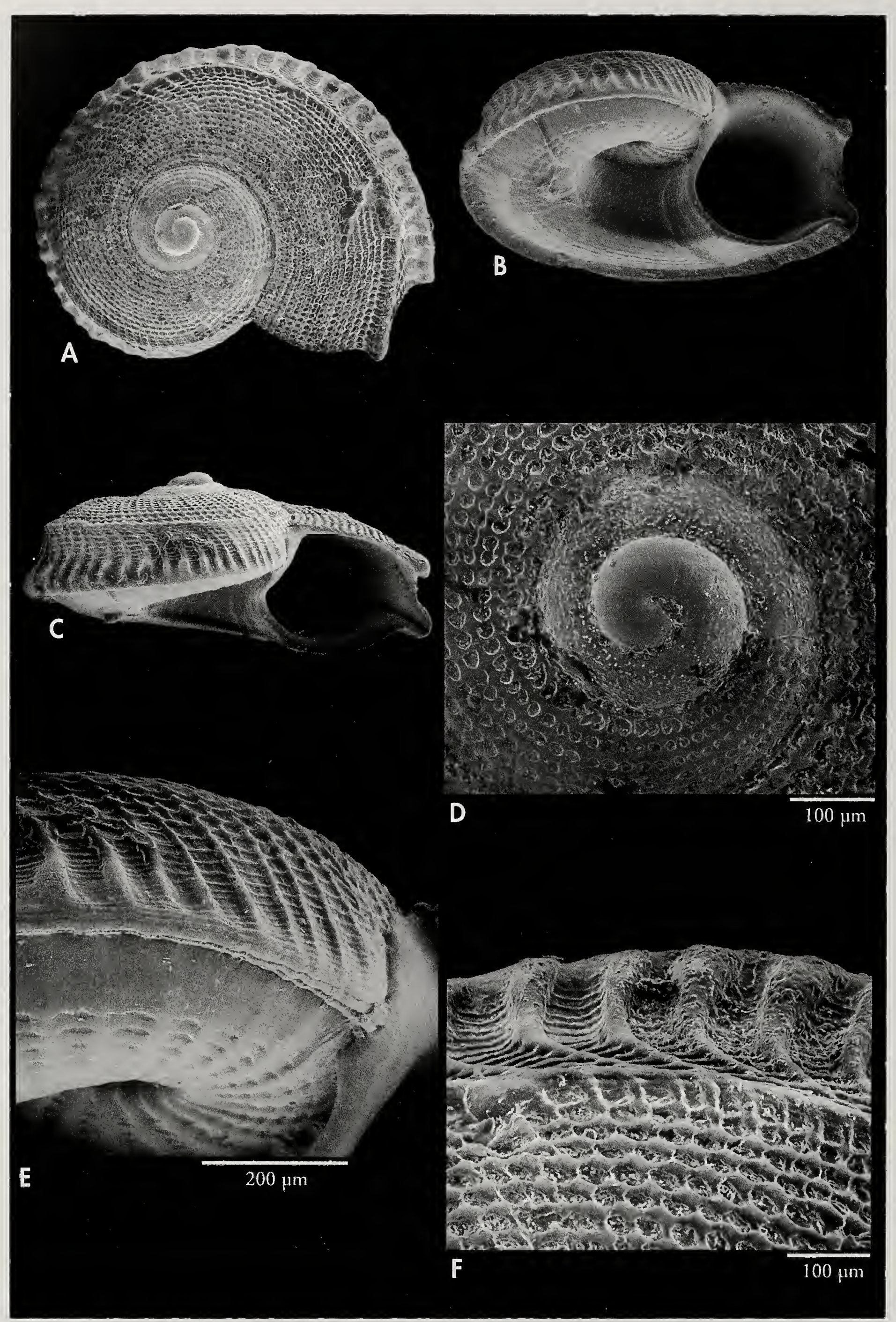


Figure 24A-F. *Anticlimax maranii* spec. nov. A-C: holotype, 1.8 mm (MNHN): D: protoconch (holotype); E-F: microsculpture. Philippines, Panglao Island, Napaling, Stn. B9, 8-10 m.
Figura 24A-F. Anticlimax maranii *spec. nov. A-C: holotipo, 1,8 mm (MNHN): D: protoconcha (holotipo); E-F: microescultura. Filipinas, Isla de Panglao, Napaling, Stn. B9, 8-10 m.*

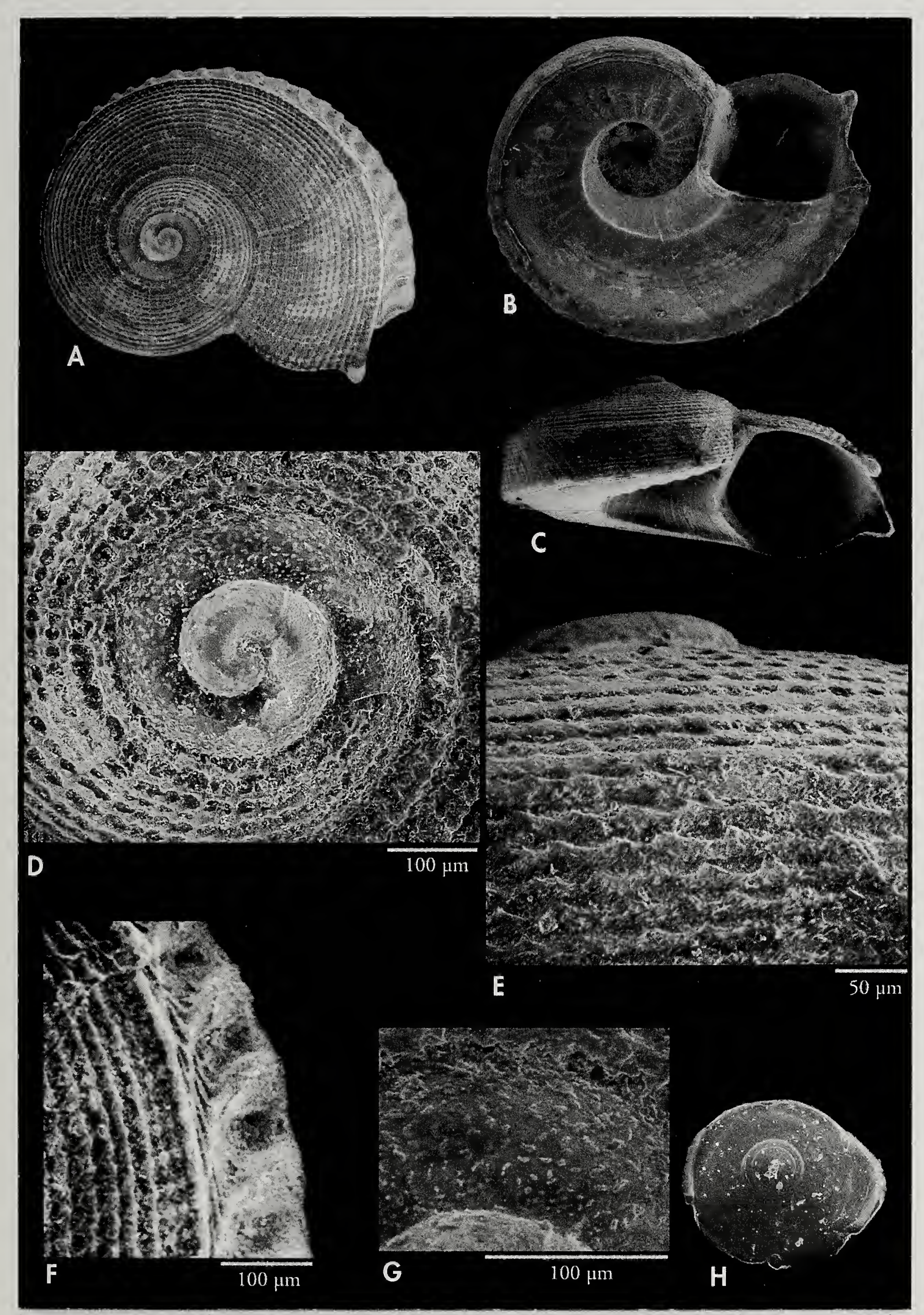


Figure 25A-H. *Anticlimax maranii* spec. nov. A-C: shell, 1.6 mm: D: protoconch; E-F: microsculpture; G: microsculpture of the protoconch; H: operculum. Philippines, Panglao Island, Napaling, Stn. B21, 20-21 m.

Figura 25A-H. Anticlimax maranii *spec. nov. A-C: concha, 1,6 mm: D: protoconcha; E-F: microescultura; G: microescultura de la protoconcha; H: opérculo. Filipinas, Isla de Panglao, Napaling, Stn. B21, 20-21 m.*

Table III. Differences between species of group 3
Tabla III: Diferencias entre las especies del grupo 3.

Species	Protoconch Nº whorls	Protoconch Diam.µm	Protoconch Microsculpture	Teleoconch Periph. keels	Teleoconch Periph. crown	Teleoconch Prominent ½ last whorl
A. reinaudi	1 3/4	370	variable in size tubercles	2	evident	10 on last 1/4
A. serrata	1 3/4	310	variable in size tubercles	2, lower attenuated	evident	14
A. tamarae	1 3/4	340	growth lines small tubercles	2	oblique prominences	8-9
A. aitormonzoi	2 and a little	410	very small tubercles	2, lower more prominent	little marked	22
A. cyclist	1 3/4	320	tubercles small and dense	2, lower more prominent	slightly prominent	12-17
A. dentata	1 3/4	450	dense tubercles	1, the upper one attenuated	well marked	16-20
A. elata	1 3/4	270	large tubercles	2	well marked	11
A. solomonensis	2	340	?	2	evident	17, irregular
A. fastigata	1 1/2	290	medium sparse tubercles	2	very evident	14
A. rhinoceros	2	420	tubercles	2	attenuated	10

Operculum fine, multispiral and with central nucleus (Figs. 2B-C) characteristic of the species of Vitrinellidae.

Radula (Figs. 2D-E) taenioglossate, formula 2-1-R-1-2. Central tooth very wide; cutting edge with a main rounded central cusp and 3 smaller cusps at each side; lateral edges expanded and thickened, free from the rest of base for most of their length; base with a pair of denticles, ventral enlargement with a well developed U-like shape.

Lateral tooth elongate, similar to central one, but its base lacks denticles; cutting edge rather long, with a main central cusp and 6-7 smaller cusps at each side.

Marginal teeth long, curved; inner marginal tooth with 7-8 small cusps on the upper third of its outer edge; outer marginal tooth similar in shape and size to the inner marginal teeth, but lacking cusps.

Habitat: Infralittoral species collected by brushing at 8-10 m, inside caves in the reef wall (Stn. B9); at 24-27 m, on the reef slope (Stn. B12) and at 20-21 m in a reef wall with small caves (Stn. B21).

Remarks: The lower prominent carina with more distinct axial sculpture on its lower part is very characteristic of this species, and not present in others of its group. In some shells this prominence is attenuated.

The radula of *Anticlimax maranii* is typical of Rissooidea or Truncatelloidea, and shows a great similarity with that of *Nozeba topaziaca* (Hedley) (in PONDER, 1984: 55, fig. H). This close relationship between Tornidae and *Nozeba*, has recently been proven by CRISCIONE & PONDER (2013) after a phylogenetic analysis of species of *Circulus*, *Pseudoliotia* and *Nozeba*, among others.

Another species which shows a great similarity in its radula and operculum is *Cyclostremiscus calameli* (Jousseaume, 1872), a vitrinellid of the western coast of Africa (in ROLAN & RUBIO, 2002).

It is also very similar to the radula of *Tornus subcarinatus* (Montagu, 1803), type species of the genus (in ROLAN & RUBIO, 2002), but the operculum of this species is oval and paucispiral, with a subcentral nucleus.

GROUP 3

Description: Low conic spire, shell wider than high. Protoconch: F2 with tubercles or fine short threads. Teleoconch: bicarinate; usually with strong axial folds between the peripheral carina and the basal one; the adapical part covered by cords or by spiral grooves. Aperture quadrangular.

This group is formed by 10 species: *A. reinaudi*, *A. serrata*, *A. tamarae*, *A. aitormonzoi*, *A. cyclist*, *A. dentata*, *A. elata*, *A. solomonensis*, *A. fastigata* and *A. rhinoceros*.

Table III with their most important differential characters may be useful.

Anticlimax reinaudi spec. nov. (Figures 5D, 26A-F)

Type material: Holotype MNHN 27120 (Figs. 5D, 26A-C).
Material examined: Only of the type locality.
Type locality: Vanuatu, NE Malo Island, 15°38.5'S, 167°15.1'E, 13 m, sand and dead corals [SANTO 2006: Stn. DB86].
Etymology: This species is named after Guy Reinaud, President of Pro-Natura International, co-organiser with MNHN of the "Our Planet Reviewed" expeditions.

Distribution: Only known from Vanuatu at 13 m.

Description: Shell very small (<1.5 mm), depressed, formed by 3 whorls of rapid growth, separated by a scarcely marked suture; carinate, widely umbilicate and with thick axial folds.

Protoconch about 370 µm in diameter and with 1 ¾ whorls; the nucleus and the first ¾ of whorl are smooth, the remaining whorl is covered by coarse granules of different sizes, randomly distributed; the end of the protoconch is evident. The teleoconch has a little more than 1 whorl; two marked carinae angle the periphery and a third one outlines the umbilicus. Spire convex, periphery and base almost flat. Ornamentation formed by spiral cords, ribs and axial striae. On the adapical part the cords cross the axial striae forming little raised nodules; on the periphery, the number of cords increases, they are finer and more numerous, but the axial striae dominate; at the base, which is almost flat, there are numerous, fine spiral cords and axial ribs that increase as they get closer to the umbilicus, but fade on the last part and do not form folds.

Aperture quadrangular; on its edge there are four angulations: one in the parietal area; another at the intersection of the columella with the umbilical carina and two more produced by the peripheral carinae that modify the outer lip. Only a slight callous layer covers the parietal area; the columella is virtually straight, not reflected or thickened; the outer lip is not very thick. Umbilicus large allowing the previous whorls to be seen, limited by a carina that angles forming a funiculus; on this wall slight traces of spiral cords can barely be observed.

Dimensions: The holotype is 1.26 mm in diameter.

Habitat: Infralittoral species found at 13 m on a sand and dead coral bottom.

Remarks: The most similar species to *Anticlimax reinaudi* spec. nov. is *Anticlimax serrata* spec. nov., from which it differs by the lower number of spiral cords on the adapical part; its straight columellar edge; the double angle observed on the outer lip, formed by the peripheral carinae, and by having a wide umbilicus delimited by another carina.

Anticlimax serrata spec. nov. (Figures 5E, 27A-H)

Type material: Holotype MNHN 27125 (Figs. 5E, 27A). Paratypes: 1 s MNHN 27126, (Figs. 27B-D) from Palikulo Bay, Vanuatu, Stn. DB53, 5 m and 1 s MNHN 27127, from S Aoré Island, Vanuatu, Stn. DB12, 10-18 m.

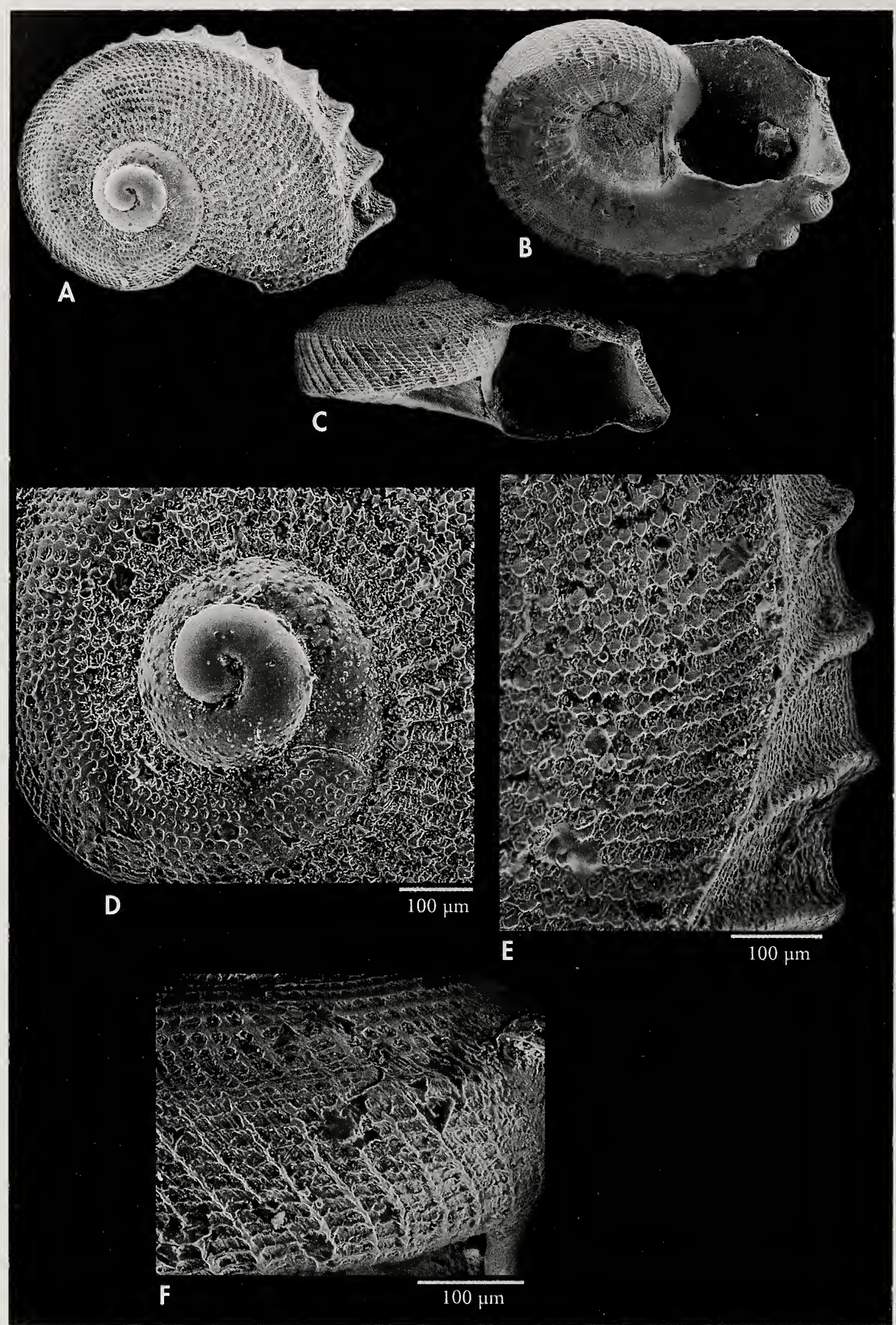


Figure 26A-F. *Anticlimax reinaudi* spec. nov. A-C: holotype, 1.26 mm (MNHN); D: apical view and protoconch (holotype); E-F: microsculpture. Vanuatu, NE Malo Island, Stn. DB86, 13 m.
Figura 26A-F. Anticlimax reinaudi *spec. nov. A-C: holotipo, 1,26 mm (MNHN); D: vista apical y protoconcha (holotipo); E-F: microescultura. Vanuatu, NE Isla de Malo, Stn. DB86, 13 m.*

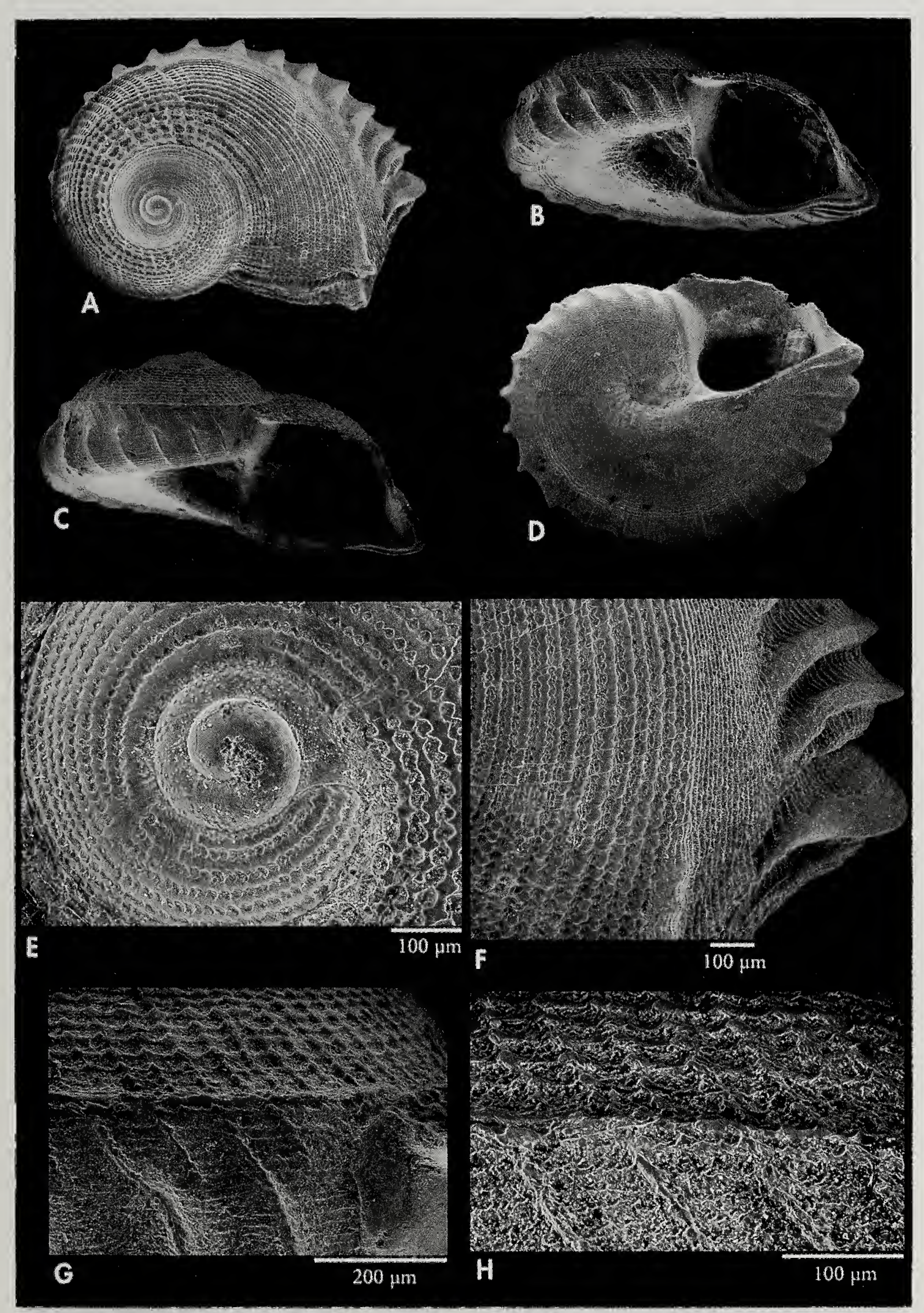


Figure 27A-H. *Anticlimax serrata* spec. nov. A: holotype, 2.47 mm, Vanuatu, S coast of Santo Island, Belmoul lagoon, Stn. LS2, 3 m (MNHN); B-D: paratype, 2.3 mm, Palikulo Bay, Vanuatu, Stn. DB53, 5 m (MNHN); E: apical view and protoconch (holotype); F-H: microsculpture and detail.
Figura 27A-H. Anticlimax serrata *spec. nov. A: holotipo, 2,47 mm, Vanuatu, costa sur de la Isla de Santo, laguna Belmoul, Stn. LS2, 3 m (MNHN); B-D: paratipo, 2.3 mm, Bahía de Palikulo, Vanuatu, Stn. DB53, 5 m (MNHN); E: vista apical y protoconcha (holotipo); F-H: microescultura y detalle.*

Material examined: (3 s): Vanuatu, SANTO 2006: 1 s, Belmoul lagoon, S coast of Santo Isl., Stn. LS2, 15°35.5'S, 167°06.2'E, 3 m (holotype); 1 s, Palikulo Bay, Stn. DB53, 15°28.8'S, 167°15.2'E, 5 m (paratype); 1 s, S Aoré Island, Stn. DB12, 15°36.6'S, 167°10.1'E, 10-18 m (paratype).
Type locality: Vanuatu, Belmoul lagoon, S coast of Santo Isl., 15°35.5'S, 167°06.2'E, 3 m [Exp. SANTO 2006: Stn. LS02].
Etymology: The specific name alludes to the prominent thick folds of the curved basal area, like a serration.

Distribution: Only known from Vanuatu, between 3 and 10 m.

Description: Shell small (<2.5 mm), wider than high, formed by nearly 4 whorls separated by a hardly marked suture, with a low spire, narrowly umbilicate.

Protoconch with about 1 ¾ whorls, measuring about 310 μm, completely smooth in its initial part and presenting thick tubercles of variable size in the remaining whorl, ending in a scar at the beginning of the teleoconch.

The teleoconch has almost 2 ¼ whorls and 2 peripheral carinae, the lower one at first bluntly rounded and becoming more acute towards the end. The ornamentation is composed of spiral cords, ribs and axial folds. The spiral cords, starting at the first whorl, intersect with the axial striae, developing in zigzag and also into nodulose cordlets. On the last whorl, starting from the peripheral carina, 20 heavy axial ribs run towards the base. These ribs are prosocline, continued on the basal peripheral carina, over which they develop into thick folds. The base is slightly concave and on it there are thick axial ribs located next to the curved basal area and spiral cordlets in its central area.

Aperture rounded; parietal area covered by a callous coating, forming an angle at the junction with the outer lip; columella thick and reflected towards the umbilicus, occluding it progressively; the columella forms an expanded area at the intersection with the outer lip, which has a smooth margin and a strong angle at the termination of the basal carina.

Umbilicus narrow and deep, not delimited by a spiral cord; small axial ribs can be observed inside.

Dimensions: the holotype is 2.47 mm in diameter.

Habitat: Infralittoral species found between 3 and 18 m depth.

Remarks: The most evident characters are the short and prominent axial ribs at the periphery, not present in any of the other known species, except *A. elata* (see below).

Anticlimax tamarae spec. nov. (Figures 5F, 28A-F, 29A-F)

Type material: Holotype MNHN 27128 (Figs. 5F, 28A-B).
Material examined: (3 s): Solomon Islands: 1 s, SALOMON 1: Stn. CP1858, 9°37.0'S, 160°42'E, 435-461 m (type material), Philippines: 2 s, PANGLAO 2005: Stn. DW2371, 8°35'N, 123°16'E, 172-175 m.
Type locality: Solomon Islands, 9°37.0'S, 160°42'E, 435-461 m [SALOMON 1: Stn. CP1858].
Etymology: The specific name is after Tamara Prieto Hernández, Galician biologist who was studying Bioinformatics in the Autonomous University of Barcelona and Genómica in Xenética in the University of Vigo.

Distribution: Only known from the Solomon Islands, between 435-461 m and the Philippine Islands, between 172-175 m.

Description: Shell very small (>1.5 mm), depressed, solid, bicarinate, and widely umbilicate.

Protoconch measuring about 340 μm, with more than 1 ¾ whorls and 2 distinct phases separated by an evident scar line; the first ½ whorl is completely smooth and the rest is covered by growth lines, tubercles of different sizes and small spiral threads that are grouped in the suture zone, sometimes obliquely. Teleoconch with 1 ¾ whorls and two peripheral carinae, one in prolongation of the suture and the other basal, which angle

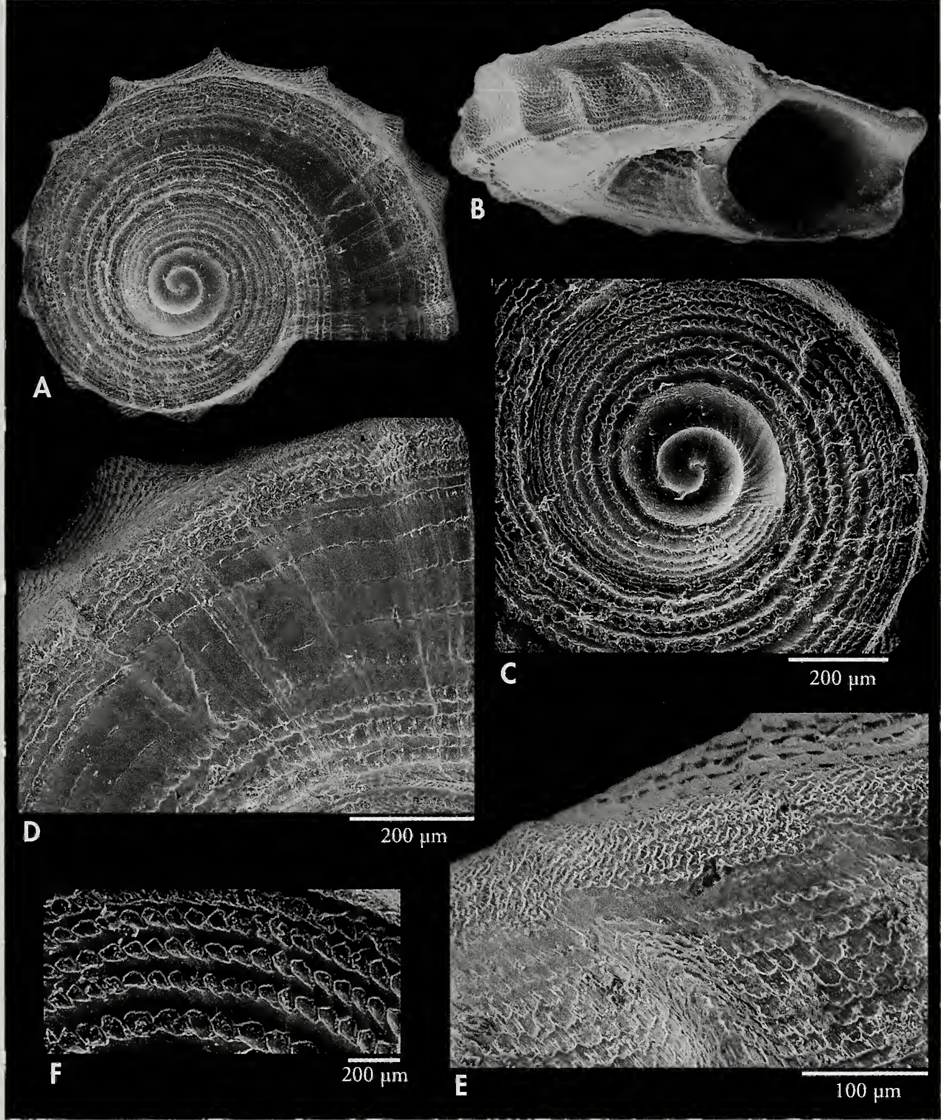


Figure 28A-F. *Anticlimax tamarae* spec. nov. A-B: holotype, 1.65 mm (MNHN); C: apical view and protoconch of the holotype; D-F: microsculpture and detail. Solomon Islands, Stn. CP1858, 435-461 m.
Figura 28A-F. Anticlimax tamarae *spec. nov. A-B: holotipo, 1,65 mm (MNHN); C: vista apical y protoconcha del holotipo; D-F: microescultura y detalle. Islas Salomón, Stn. CP1858, 435-461 m.*

the shell. The shell is completely covered by spiral cords of different sizes that develop in zigzag and cross with the axial growth lines forming a reticule. The adapical part is covered by spiral cords, wider on the central area and narrower near the suture and the peripheral areas. The periphery between the carinae is completely covered by spiral cords; thick sinuous axial folds develop between both carinae, which seen apically give a star-shaped profile to the shell.

The base is slightly convex and has very broad and low spiral cords.

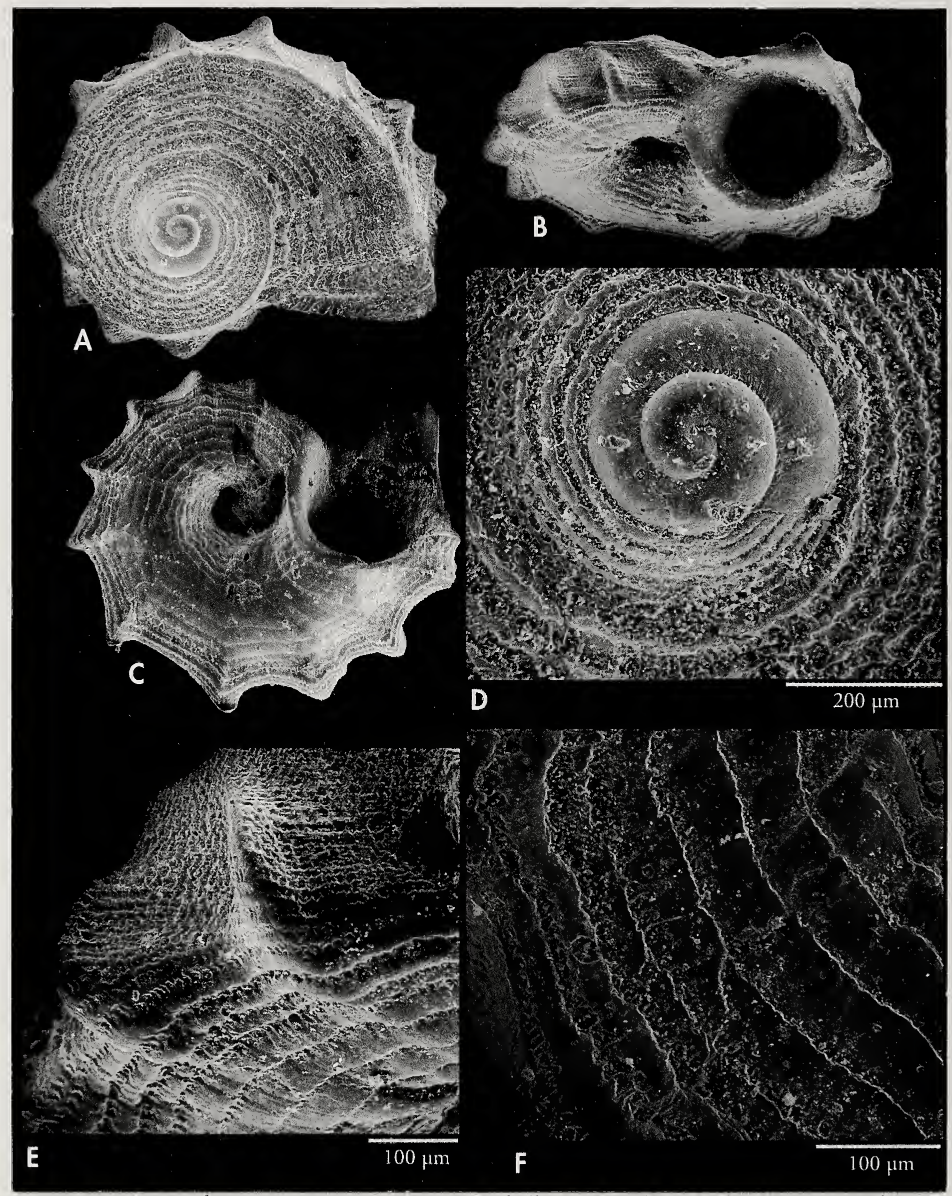


Figure 29A-F. *Anticlimax tamarae* spec. nov. A-C: shell, 1.7 mm (MNHN); D: protoconch; E-F: microsculpture. Philippines, PANGLAO 2005, Stn. DW2371, 172-175 m.

Figura 29A-F. Anticlimax tamarae *spec. nov. A-C: concha, 1,7 mm (MNHN); D: protoconcha; E-F: microescultura. Filipinas, PANGLAO 2005, Stn. DW2371, 172-175 m.*

Umbilicus wide allowing the previous whorls to be seen, completely covered inside by spiral cords. Aperture oval, prosocline; parietal area with a thick callous coating; columella arched, very reflected towards the umbilicus; outer lip modified by the spiral cords but mainly by the peripheral carinae which angles it internally and prolong it laterally.

Dimensions: the holotype is 1.65 mm in diameter.

Habitat: Bathyal species dredged at 435-461 m in the Solomon Islands and at 172-175 m in the Philippines.

Remarks: The species is characterized by the large size and ornamentation of its protoconch; the axial folds that develop between the peripheral carinae; the spiral cords in zigzag which are more evident on the periphery; the large umbilicus fully covered inside by spiral cords. No other species looks like this.

Anticlimax aitormonzoi spec. nov. (Figures 5G, 30A-F, 31A-G)

Type material: Holotype MNHN 27130 (Figs. 5G, 30A-B) and 8 paratypes MNHN 27131 (Fig. 30C-D).
Material examined: (34 s): Philippines, PANGLAO 2004: 9 s, Panglao Island, off San Isidro, Stn. T9, 9°33.5'N- 9°33.9'N, 123°49.5'-123°50.5'E, 97-120 m, fine sand with seagrass (type material); 3 s, Between Panglao and Pamilacan Island, Stn. T27, 9°33'N, 123°51'E, 106-137 m, fine sand and mud with echinoderms; 2 s, Bohol Island, Cortes, Stn. T26, 9°43'N, 123°49'E, 123-135 m, mud; 5 s, Panglao Island, Bolod, Stn. T2, 9°32'N, 123°48'E, 152 m, coarse sand; 1 s, Panglao Island, Pontod Islet, Stn. D4, , 9°33.1'N, 123°44.0'E, 0-2 m, soft bottom with seagrass; 2 s, Bohol Island, west Baclayon, Stn. T7, 9°36.1'N, 123°53.3'E, 61-62 m, muddy fine sand; 2 s, Panglao Island, off San Isidro, Philippines, Stn. T10, 9°33.4'N-9°33.8'N, 123°49.6'-123°51.5'E, 117-124 m, mud and fine sand; 8 s, Bohol Island, west of Baclayon, Stn. T6, 9°35.1'N, 123°51.2'E, 34-82 m, coarse muddy sand with large sponges; 1 s, Bohol Island, Cortes, Stn. T18, 9°41.8'N, 123°49.9'E, 80-100 m, muddy bottom with sponges; 1 s, Panglao Island, Biking, Stn. S1, 9°35.3'N, 123°50.5'E, 5 m, reef slope with overhangs.
Type locality: Philippines, Panglao Island, off San Isidro, 9°33.5-33.9'N, 123°49.5-50.5'E, 97-120 m, fine sand with seagrass [PANGLAO 2004: Stn. T9].
Etymology: The specific name is after the grandson of the first author Aitor Monzó.

Distribution: Only known from Panglao and Bohol islands, Philippines, between 2 and 152 m.

Description: Shell small (<2.7 mm), formed by 4 ¼ whorls separated by a slightly marked suture; the shell is wider than high, with a low spire and narrowly umbilicate.

The protoconch has a little more than 2 whorls, measures about 410 μm in diameter, is completely smooth on its initial part and has fine tubercles on the remaining whorl, without any terminal thickening. The teleoconch has 2 whorls and 2 carinae, one peripheral, the other basal. The ornamentation is composed of spiral cords, axial folds and rounded cells in the spaces between the cords. On the adapical part, the first spire whorl bears 4-5 spiral cords which develop in zigzag crossing the axial striae. Nodulose cordlets appear after the first whorl, 26 on the last ½ whorl; in the area near the peripheral carina, sinuous axial ribs predominate over the cords.

The space between carinae has 15 spiral cordlets as seen in apertural position. On the last half whorl, 20-22 thick folds appear on the lower peripheral carina being more prominent those near the end of the whorl. Base with short axial folds, and thin growth lines.

Aperture quadrangular; parietal area covered by a broad callous layer; columella arched, thick and reflected towards the umbilicus; the outer lip has a smooth margin and two angles, the most prominent is situated at the level of the basal carina and prolongs the lip laterally. Umbilicus funnel-shaped, narrow and deep, not bounded by a spiral cord, inside there are 2-3 spiral cordlets.

Dimensions: the holotype is 2.76 mm in diameter; the larger photographed paratype is 2.6 mm.

Habitat: Species of wide bathymetric distribution, found in infra-circalittoral levels. Dredged at 0-2 m, in soft bottom with seagrass (Stn. D4) and trawled at 152 m, in coarse sand bottom (Stn. T2); at 61-62 m, in muddy fine sand bottom (Stn. T7); at 97-120 m, in fine sand with seagrass (Stn. T9); at 117-124 m, in mud



Figure 30A-F. *Anticlimax aitormonzoi* spec. nov. A-B: holotype, 2.76 mm (MNHN): C-D: paratypes, 2.6, 2.4 mm (MNHN); E: protoconch of a paratype; F: microsculpture. Philippines, Panglao Island, off San Isidro, Stn. T9, 97-120 m.

Figura 30A-F. Anticlimax aitormonzoi *spec. nov. A-B: holotipo, 2,76 mm (MNHN): C-D: paratipos, 2,6, 2,4 mm (MNHN); E: protoconcha de un paratipo; F: microescultura. Filipinas, Isla de Panglao, frente a San Isidro, Stn. T9, 97-120 m.*

and fine sand bottom (Stn. T10); at 123-135 m, in mud bottom (Stn. T26) and at 106-137 m, in fine sand and mud bottom with echinoderms (Stn. T27).

Remarks: The differences with the most similar species are: *Anticlimax bicornis* spec. nov. has a wider umbilicus and its periphery lacks prominences; *A. serrata* spec. nov. has prominences all over the periphery of the last whorl and its umbilicus is more sculptured; *A. reinaudi* spec. nov. has a flat periphery, an angled funnel shaped umbilicus and a more sculptured protoconch.



Figure 31A-G. *Anticlimax aitormonzoi* spec. nov. A-B: shell, 2.18 mm (MNHN); C: paratype, 2.55 mm; D: protoconch; E-G: microsculpture and detail. Philippines, between Panglao and Pamilacan Island, PANGLAO 2004, Stn. T27, 106-137 m, fine sand and muddy bottom with echinoderms.

Figura 31A-G. Anticlimax aitormonzoi *spec. nov. A-B: concha, 2,18 mm (MNHN); C: paratipo, 2,55 mm; D: protoconcha; E-G: microescultura y detalle. Filipinas, entre las islas de Panglao y Pamilacán, PANGLAO 2004, Stn. T27, 106-137 m, arena fina y fango con equinodermos.*

Anticlimax cyclist spec. nov. (Figures 2F-G, 5H, 32A-G, 33A-F, 34A-F)

Type material: Holotype MNHN 27226 (Figs. 5H, 32A-C) and one paratype MNHN 27227.
Material examined: (4 s): Philippines, PANGLAO 2004: 2 s, Panglao Island, Looc, Stn. S32, 9°35.8′N, 123°44.6′E, 2-3 m, hard plateau with sand covering rocks (type material). Papua New Guinea, PAPUA NIUGINI: Stn PS43, 1 s, S Urembo I., 5°14.7′S, 145°47.4′E, 14 m, outer slope; 1 s, Bilbil Island, Stn. PB29, 5°18′S, 145°46.1′E, 17 m.
Type locality: Panglao Island, Looc, 9°35.8′N, 123°44.6′E, 2-3 m, hard plateau with sand covering rocks [PANGLAO 2004: Stn. S32].
Etymology: The specific name refers to the bicycle which has a similar toothed wheel.

Distribution: Only known from the Philippines, between 2-3 m, and Papua New Guinea, between 14 and 17 m.

Description: Shell small (>2 mm), wider than high, formed by 3 ½ whorls separated by a marked suture, with a low spire, widely umbilicate.

The protoconch has 1 ¾ whorls, measuring about 320 µm in diameter and having two distinct phases; the first is completely smooth and the second is covered by thick tubercles. There is no clear separation with the teleoconch except by the change of sculpture. The teleoconch has 2 whorls and 3 carinae, one peripheral, one basal and one periumbilical. The ornamentation is quite complex; it is composed of spiral cords, ribs and axial folds; rounded cells in the spaces between ribs and a filiform mesh occupying the cells.

On the adapical part, the spiral cords cross with axial striae in the first whorl to form 7 cords that develop in zigzag and show rounded cells between the cords; on the last whorl the ribs are more evident and intersect with the spiral cordlets to form small nodules; Up to 22-24 cords can be seen on the last half whorl.

The space between carinae (peripheral-basal) shows more than 30 fine spiral cordlets in apertural view; on the last whorl there are 20-22 thick axial folds on the the basal carina, which are projecting further than the periphery. Spire and base are convex, the space between the carinae is concave. Base is completely smooth on the last whorl; in previous whorls the axial ribs are predominant over spiral cords, with a groove-like space between the cords, limited by the axial ribs. A third carina, periumbilical, angles and limits the umbilicus.

Aperture quadrangular; parietal area covered by a thick callous coating, with an angle at the point of union of the outer lip with the previous whorl; columella arched and reflected towards the umbilicus; adapical part of outer lip crenulated externally by the the termination of the spiral cords; on it there are two angles that correspond to each of the carinae; the greater angle corresponds to the basal carina and expands laterally the aperture. Umbilicus height and width, which allows the previous whorls to be seen,limited by a carna that angles it; umbilical wall convex, smooth, with fine growth lines.

External anatomy: The soft parts (Fig. 2F-G) are here described based on the photographs of a living individual of *Anticlimax* cf. *cyclist* spec. nov. from SANTO [DSCN1661]. The head has a long and narrow snout, bilobed distally and a little depressed. Long cephalic tentacles finely ciliated in their distal half are observed with an eye on a slight basal bulge. We could not see any pallial tentacles on the right side. The anterior end of the foot is expanded into small lateral projections; posteriorly the foot is rounded, no metapodial tentacle was observed. Opercular lobe simple; there are no tentacles associated with the opercular lobe.

Colour: the buccal mass and an area behind the eyes are pale red. Head, snout, foot and cephalic tentacles are translucent with opaque white flecks.

The early whorls of live specimens are brown from the digestive gland showing through the shell.

Dimensions: the holotype is 2.68 mm in diameter.

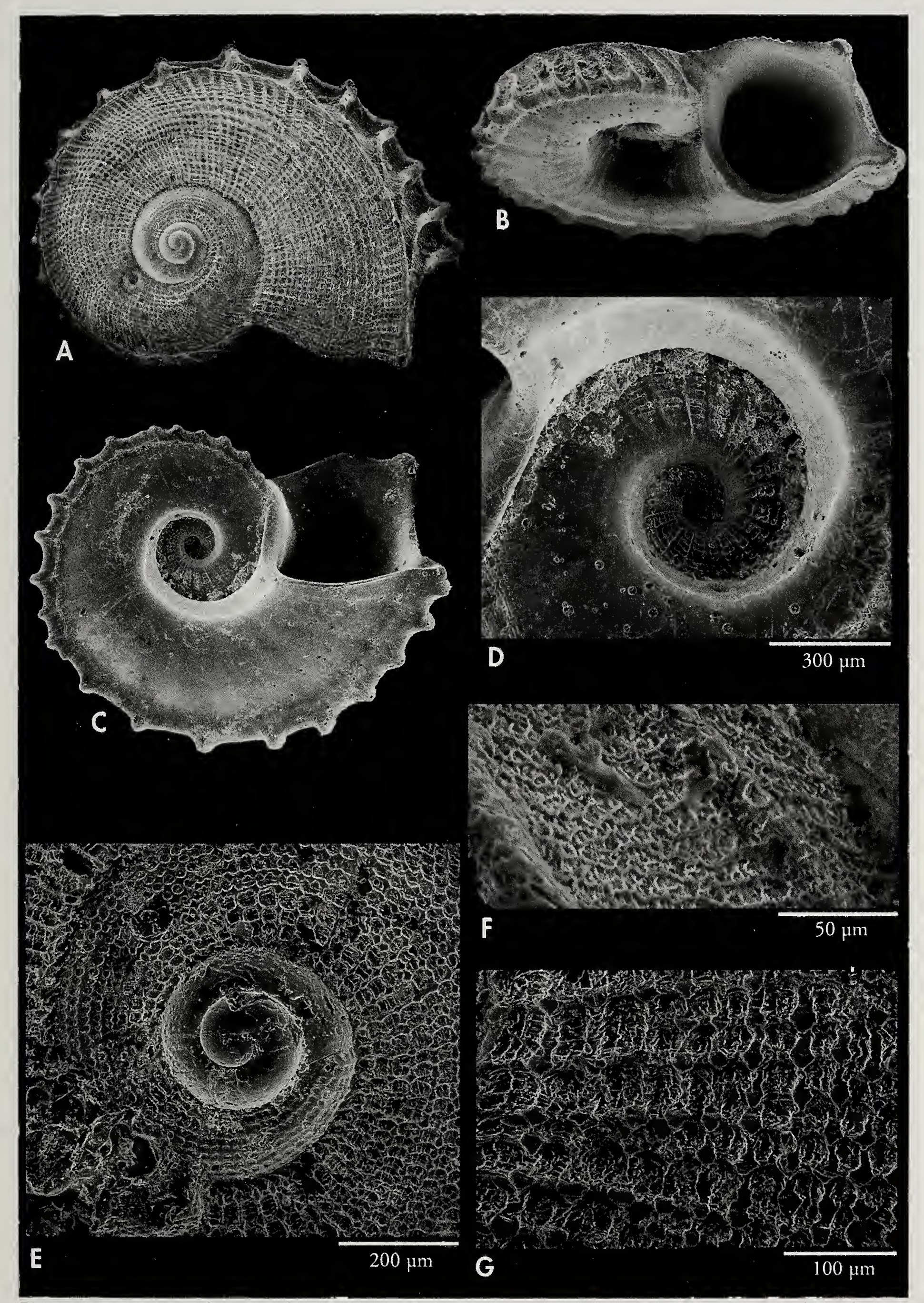


Figure 32A-G. *Anticlimax cyclist* spec. nov. A-C: holotype, 2.68 mm (MNHN); D: umbilical view; E: protoconch of the paratype; F-G: microsculpture. Panglao Island, Baclayon, Philippines, Stn. S32, hard bottom with sand covering rocks, at 2-3 m.

Figura 32A-G. Anticlimax cyclist *spec. nov. A-C: holotipo, 2,68 mm (MNHN); D: vista umbilical; E: protoconcha del paratipo; F-G: microescultura. Isla de Panglao, Baclayon, Filipinas, Stn. S32, fondo duro con arena cubriendo las rocas, a 2-3 m.*

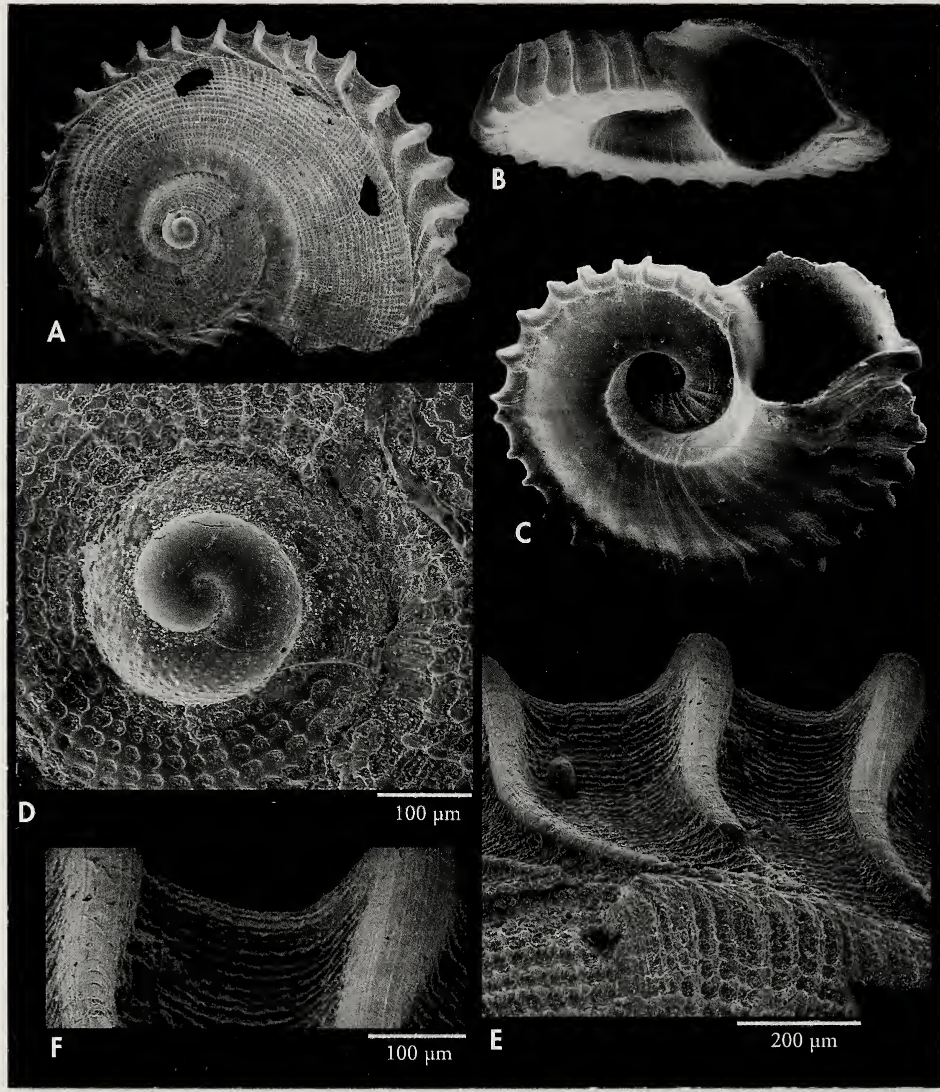


Figure 33A-F. *Anticlimax cyclist* spec. nov. A-C: shell, 3.0 mm; protoconch; E-F: microsculpture and detail. Papua New Guinea, S Urembo Island, Stn. PS43, 14 m.
Figura 33A-F. Anticlimax cyclist *spec. nov. A-C: concha, 3,0 mm; protoconcha; E-F: microescultura y detalle. Papua Nueva Guinea, S de la Isla de Urembo, Stn. PS43, 14 m.*

Habitat: Infralittoral species collected in Philippines by suction on hard plateau with sand covering rocks, at 2-3 m (Stn. S32). In Papua New Guinea it has been dredged at 14 m (Stn. PS43) and 17 m (Stn. PB29).

Remarks: The species is characterized by the low spire; the spiral cords that are nodulose on the adapical part; the filiform ornamentation that runs through the cells and the completely smooth base.

The species with which it has more similarity is *Anticlimax maranii* spec. nov. which differs by the adapical nodulose cords; the greater number of spiral cordlets and smaller number of axial folds in the space between the periph-

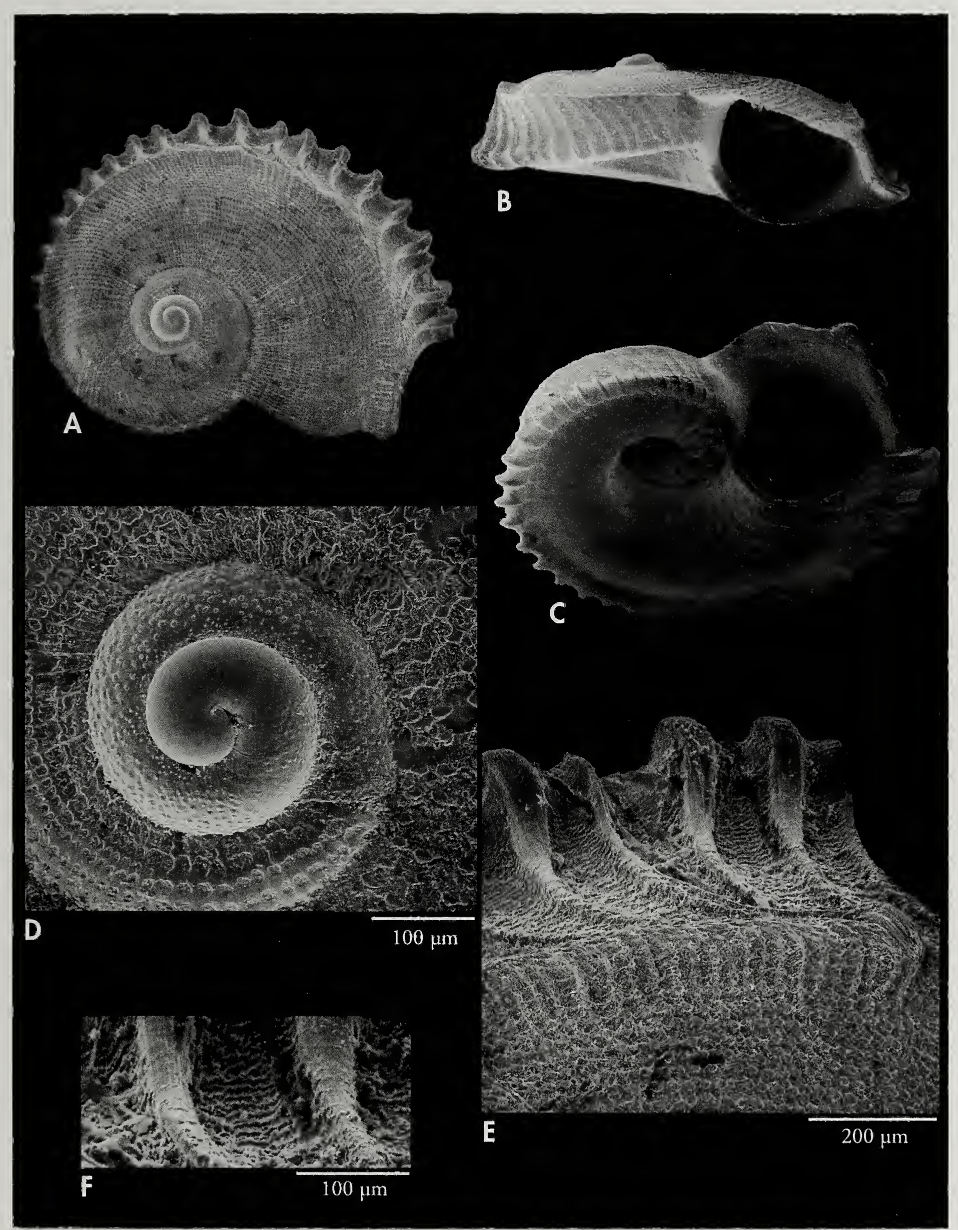


Figure 34A-F. *Anticlimax cyclist* spec. nov. A-C: shell, 2.3 mm; D: protoconch; E-F: microsculpture and detail. Papua New Guinea, Bilbil Island, Stn. PB29, 17 m.
Figura 34A-F. Anticlimax cyclist *spec. nov. A-C: concha, 2,3 mm; D: protoconcha; E-F: microescultura y detalle. Papua Nueva Guinea, Isla de Bilbil, Stn. PB29, 17 m.*

eral and basal carinae, and in having the base completely smooth.

From *A. dentata* spec. nov. it is distinguished by its very low spire; the smaller size of its protoconch; the lack of ornamentation both on its base and umbilical wall and the less elevated aperture.

Anticlimax dentata spec. nov. (Figures 5I, 35A-F, 36A-F, 37A-F)

Type material: Holotype MNHN 27194 (Figs. 5I, 35A-B).
Material examined: (9 s): Philippines, PANGLAO 2004: 1 s, Pamilacan Island, Stn. S22, 9°29.4′N, 123°56.0′E, 15-20 m, hard ground covered with sand; 1 s, Panglao Island, Biking, Stn. S1, 9°35.3′N, 123°50.5′E, 5 m, reef slope with overhangs; 1 s, Bohol Island, Ubajan, Stn. S25, 9°41.5′N, 123°51.0′E, 21 m, muddy (type material); 2 s, Bohol Island, Baclayon, Stn. S32, 9°35.8′N, 123°44.6′E, 60-62 m, muddy sand. Papua New Guinea, PAPUA NIUGINI: 2 s, S Megas Islet, Stn. PS12, 5°05.3′S, 145°48.6′E, 6 m; 1 s, S Yabob I., Stn. PD66, 5°15.5′S, 145°47.3′E, 2-6 m; 1 s, Hargun I., Stn. PS18, 5°01.6′S, 145°48.1′E, 16 m.
Type locality: Philippines, Bohol Island, Ubajan, 9°41.5′N, 123°51.0′E, 21 m, muddy bottom [PANGLAO 2004: Stn. S22].
Etymology: The specific name refers to the peripheral carina with prominences that look like teeth.

Distribution: Only known from the Philippines, between 5 and 60 m, and Papua New Guinea, between 6 and 16 m.

Description: Shell small (<3.2 mm), with a relatively high spire, strongly bicarinate and widely umbilicate.

The protoconch measures about 450 μm, has 1 ¾ whorls and 2 distinct phases; the first is completely smooth and the second is covered with thick tubercles scattered randomly. The teleoconch has 2 whorls and two carinae which angle the shell, one situated peripherally and the other basally. The ornamentation is composed of spiral cords, ribs and axial folds and rounded or quadrangular cells in the spaces between the cords, that have fine threads inside.

On the adapical part, the spiral cords develop in zigzag. At the beginning of the teleoconch 6 cords can be observed, which subsequently intersect with the axial ribs forming nodules; on the last quarter-whorl, between the peripheral carina and the suture there are up to 15-16 cords. The space between the peripheral and the basal carinae is fully covered by spiral cordlets and axial ribs which turn into thick folds extending from the middle area towards the basal carina. Up to 19 thick axial folds of similar shape and size may be seen on the last half whorl. The base is flat and completely covered by spiral cordlets and axial growth-lines.

The umbilicus is wide and deep, limited by a carina which angles it; in its interior there are spiral cordlets and marked growth lines; umbilical wall convex. Aperture quadrangular, prosocline, very high; parietal area with a thick callus; columella arched, thickened and reflected towards the umbilicus; outer lip modified by the basal carina which angles it internally and prolongs it laterally; adapical edge of the outer lip crenulated externally by the termination of the spiral cords.

Dimensions: the holotype is 2.35 mm in diameter.

Habitat: Infralittoral species collected by suction at 15-20 m, on hard substrate covered with sand (Stn. S22); on a reef slope with overhangs at 5 m (Stn. S1); on a muddy bottom at 21 m (Stn. S25) and on a muddy sand bottom, at 60-62 m (Stn. S32). In Papua New Guinea it has been collected between 2 and 16 m.

Remarks: The species is characterized by its high spire, the very wide protoconch and the ornamentation on phase 2 (of the protoconch); the regularity of the spiral cords on the adapical part; the regularity of shape and size of the axial folds in the space between carinae; the periumbilical carina, the high aperture and the presence of one single external angle on the external lip.

Anticlimax elata spec. nov. (Figures 6A, 38A-E)

Type material: Holotype MNHN 27193 (Figs. 6A, 38A-B).
Material examined: (4 s): Philippines, PANGLAO 2004: 1 s, Bohol Island, Manga, Stn. S21, 9°41.7′N, 123°50.9′E, 4-12 m, reef slope with silt (type material); 1 s, Bohol Island, Ubajan, Stn. S25, 9°41.5′N,

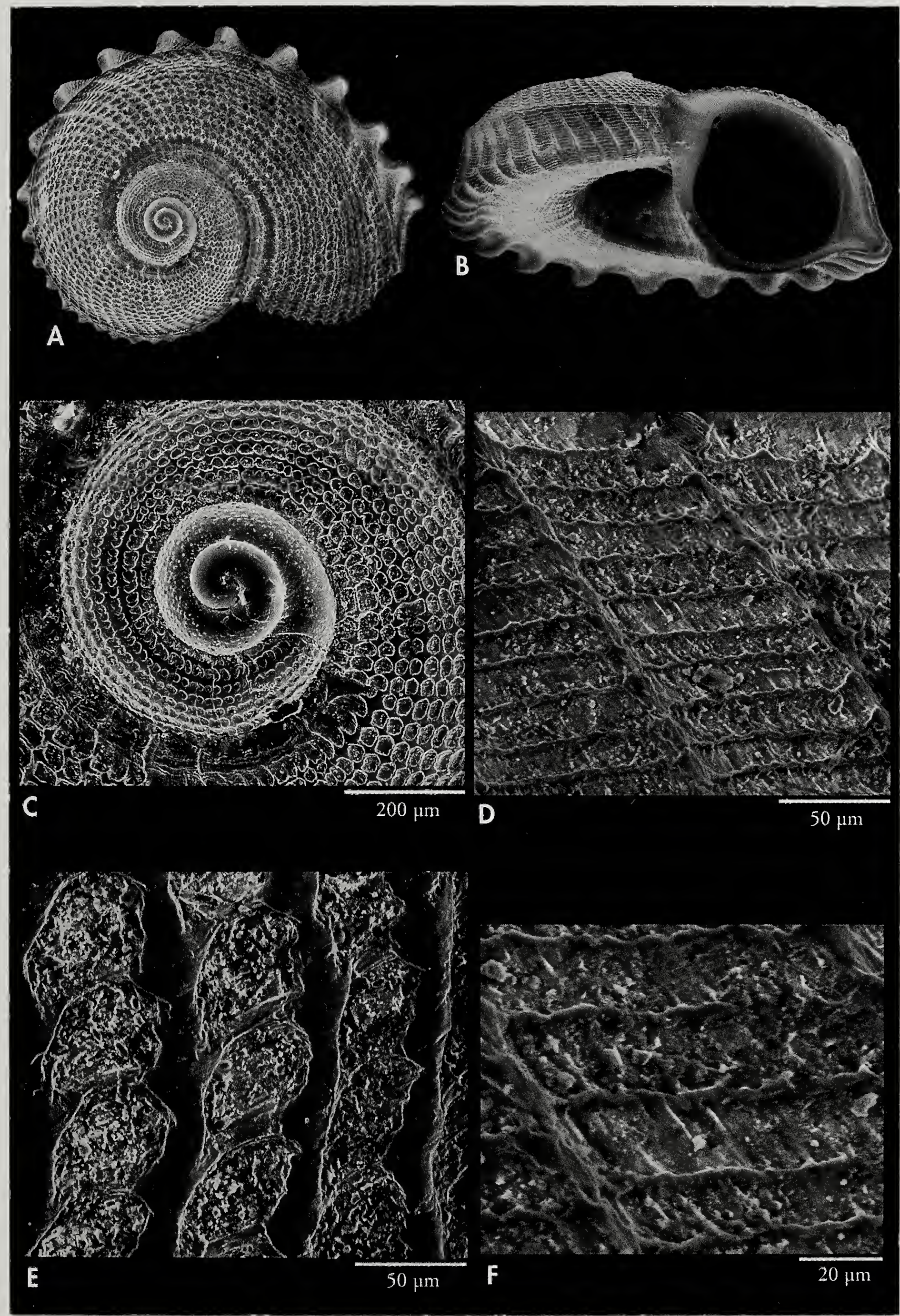


Figure 35A-F. *Anticlimax dentata* spec. nov. A-B: holotype, 2.35 mm, (MNHN); C: protoconch (holotype); D-F: microsculpture. Philippines, Bohol Island, Ubajan, Stn. S25, 21 m.
Figura 35A-F. Anticlimax dentata *spec. nov. A-B: holotipo, 2,35 mm, (MNHN); C: protoconch (holotipo); D-F: microescultura. Filipinas, Isla de Bohol, Ubajan, Stn. S25, 21 m.*

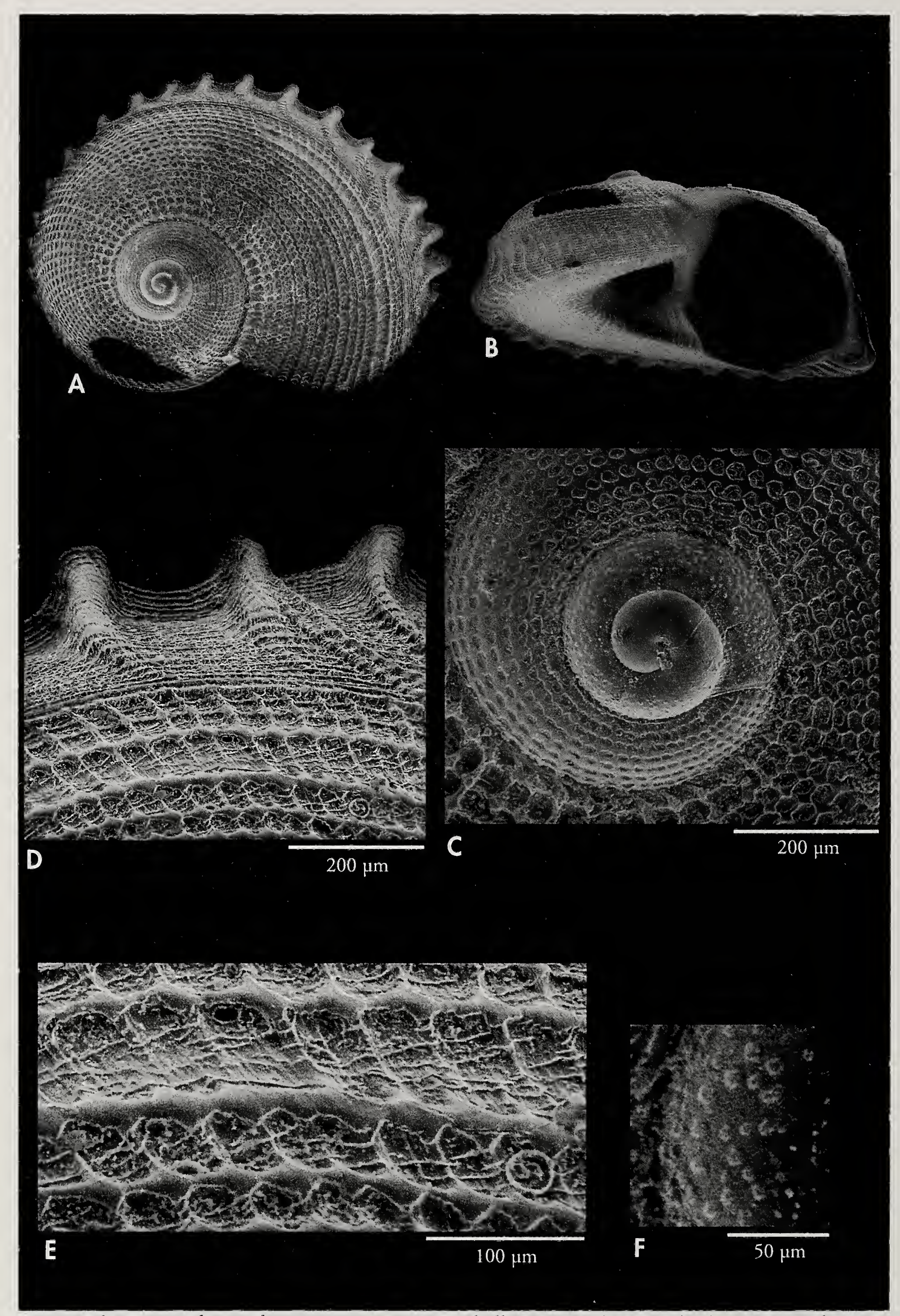


Figure 36A-F. *Anticlimax dentata* spec. nov. A-B: shell, 2.3 mm (MNHN): C: protoconch; D-E: microsculpture. F: microsculpture of the protoconch. Philippines, Pamilacan Island, Stn. S22, 15-20 m.
Figura 36A-F. Anticlimax dentata *spec. nov. A-B: concha, 2,3 mm (MNHN): C: protoconcha; D-E: microescultura. F: microescultura de la protoconcha. Filipinas, Isla de Pamilacán, Stn. S22, 15-20 m.*

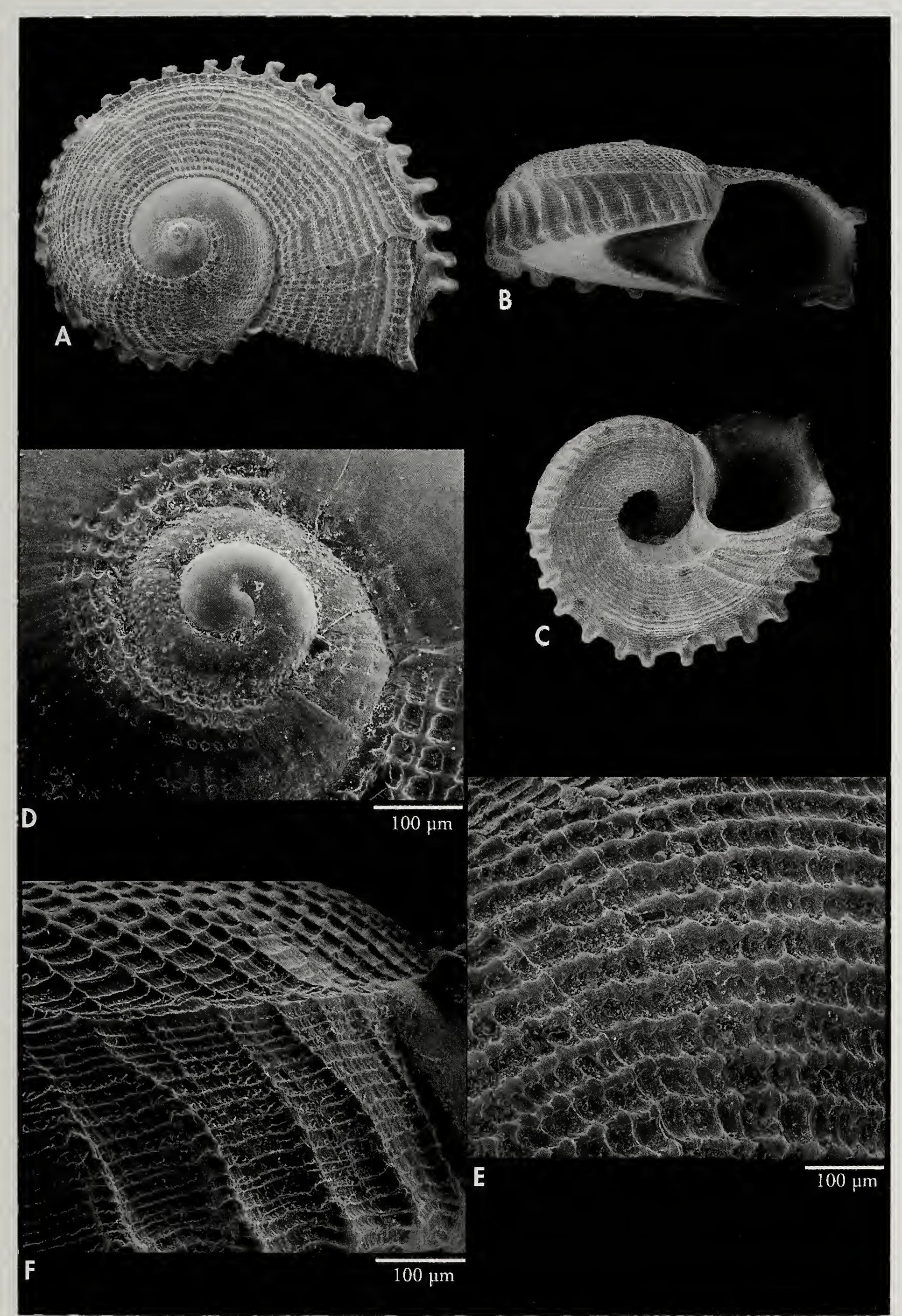


Figure 37A-F. *Anticlimax dentata* spec. nov. A: shell, 3.1 mm, Stn. PS18; B-C: shells, 2.9, 2.2 mm, Stn. PS12; D: protoconch; E-F: microsculpture. S Megas Islet, Papua New Guinea, Stn. PS12, 6 m.
Figura 37A-F. Anticlimax dentata *spec. nov. A: concha, 3,1 mm, Stn. PS18; B-C: conchas, 2,9, 2,2 mm, Stn. PS12; D: protoconcha; E-F: microescultura. S Islote de Megas, Papua Nueva Guinea, Stn. PS12, 6 m.*

123°51.0'E, 21 m, mud; 2 s, Bohol Island, Cortes, Stn. T18, 9°41.8'N, 123°49.9'E, 80-100 m, muddy bottom with sponges.
Type locality: Philippines, Bohol Island, Manga, 9°41.7'N, 123°50.9'E, 4-12 m, reef slope with silt.
Etymology: The specific name alludes to the high spire, infrequent in the group.

Distribution: Only known from the Philippines between 12 and 80 m.

Description: Shell small (<2.0 mm), formed by 3 ½ whorls, with a relatively high spire, strongly bicarinate and widely umbilicate.

The protoconch measures about 270 μm, has 1 ¾ whorls and 2 distinct phases; the first is completely smooth and the second is covered with thick tubercles scattered randomly. The teleoconch has 1 ¾ whorls and two carinae which angle the shell, one peripheral and the other basal. The ornamentation is composed of spiral cords, ribs and axial folds with rounded cells in the spaces between cords.

On the adapical part, the spiral cords develop in zigzag. Seven cords may be observed at the beginning of the teleoconch, which are subsequently transformed into nodules by the crossing of the axial ribs, and become 17 in the last quarter-whorl between the peripheral carina and the suture. The space between the peripheral and the basal carinae is fully covered by spiral cordlets, whose number increases when close to the aperture, and by axial ribs that develop into thick folds from halfway down and over the basal carina. There are 14-15 thick axial folds on the last whorl, which give the shell a star-like profile in apical view. The base is concave and completely covered by thick axial folds and spiral cordlets.

Umbilicus narrow and deep, progressively occluded by the thickening of the columella; in its interior there are spiral cordlets. Aperture quadrangular, prosocline; parietal area with a thick callous layer; columella arched, thickened at the base forming a cord that occludes the umbilicus; outer lip modified by the carinae which angle it internally and also prolong it laterally.

Dimensions: the holotype is 1.34 mm in diameter.

Habitat: Infra-circalittoral species suctioned at 4-12 m, on reef slope with silt and mud, at 21 m (Stn. S25); trawled on muddy bottom with sponges at 80-100 m (Stn. T18).

Remarks: The species is characterized by its high spire; the small size of the protoconch; the regularity of the nodulose cords and the large axial folds; its quadrangular aperture and the columellar thickening forming a cord that occludes the umbilicus.

Anticlimax serrata spec. nov. is extremely similar but is more depressed, has a slightly larger protoconch, more axial peripheral ribs and the umbilical funnel is smaller.

Anticlimax solomonensis spec. nov. (Figures 6B, 39A-F)

Type material: Holotype MNHN 27196 (Figs. 6B, 39A-B).
Material examined: Only from the type locality.
Type locality: Solomon Islands, 8°40'S, 160°04'E, 396-411 m [SALOMON 1: DW1762].
Etymology: The specific name is of the archipelago where the holotype was found.

Distribution: Only known from the Solomon Is. between 396-411 m.

Description: Shell small (<2 mm), with a relatively high spire, strong, bicarinate and narrowly umbilicate.

The protoconch measures about 340 μm, has 2 whorls and 2 distinct phases; the first phase is completely smooth but the second, seemingly smooth, has thin growth lines near the suture. The teleoconch has just over 1 ½ whorls and two carinae which angle the shell, one peripheral and the other basal.

The ornamentation is composed of spiral nodulose cords, ribs and axial folds; cells of different shape occur in

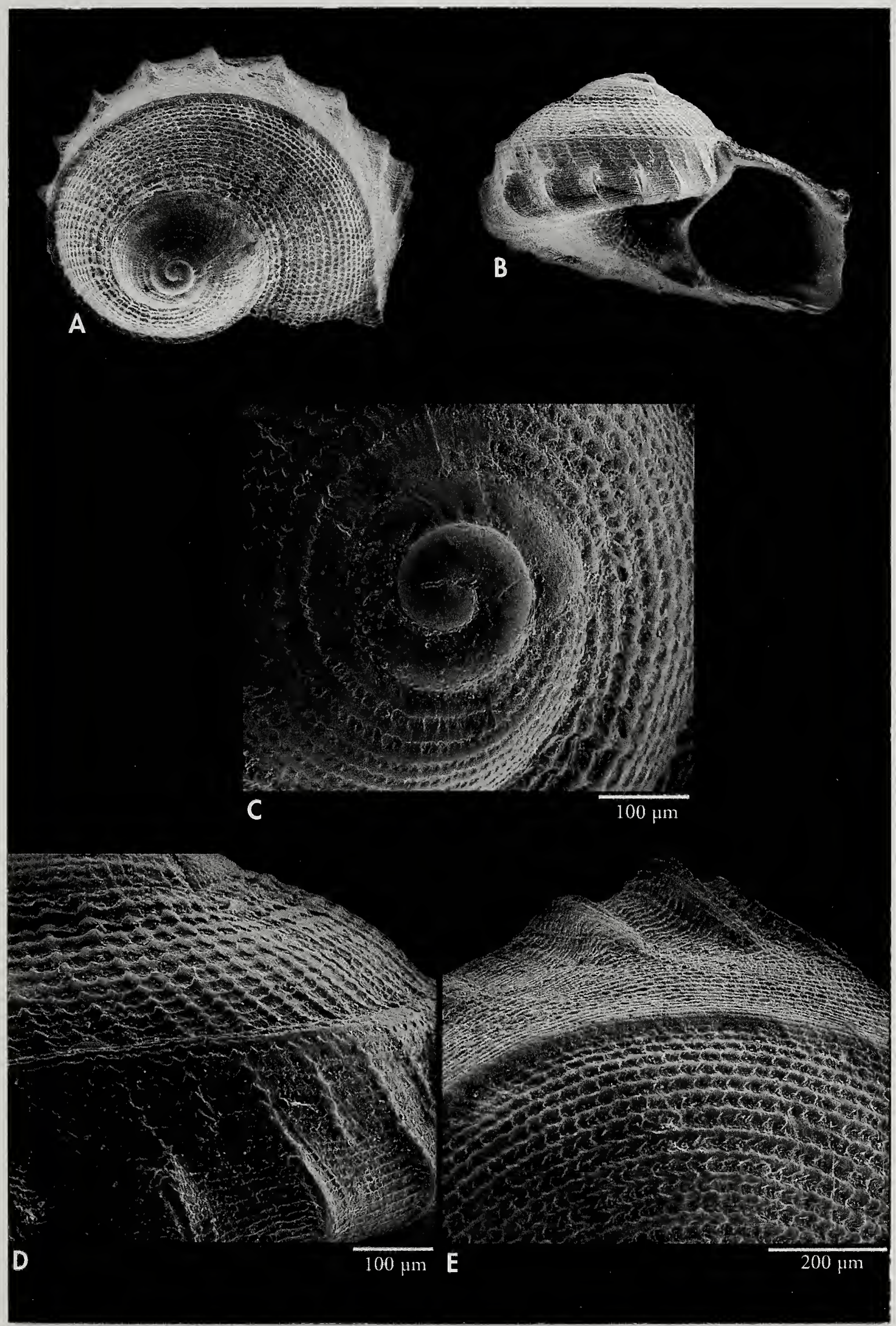


Figure 38A-E. *Anticlimax elata* spec. nov. A-B: holotype, 1.34 mm (MNHN): C: protoconch (holotype); D-E: microsculpture. Philippines, Bohol Island, Manga, Stn. S21, 4-12 m.
Figura 38A-E. Anticlimax elata *spec. nov. A-B: holotipo, 1,34 mm (MNHN): C: protoconcha (holotipo); D-E: microescultura. Filipinas, Isla de Bohol, Manga, Stn. S21, 4-12 m.*

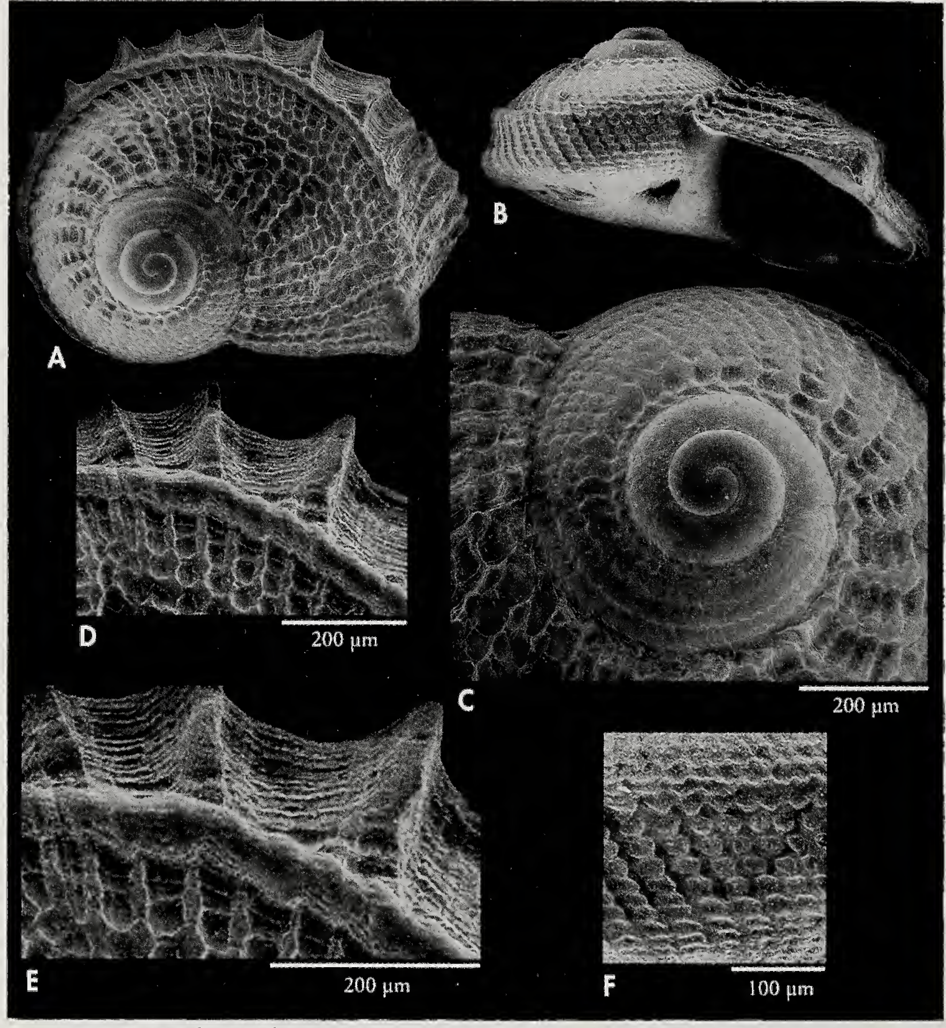


Figure 39A-F. *Anticlimax solomonensis* spec. nov. A-B: holotype, 1.5 mm (MNHN): C: protoconch (holotype); D-F: microsculpture. Solomon Islands, SALOMON 1, DW1762, 396-411 m.
Figura 39A-F. Anticlimax solomonensis *spec. nov. A-B: holotipo, 1,5 mm (MNHN): C: protoconcha (holotipo); D-F: microescultura. Islas Salomón, SALOMON 1, DW1762, 396-411 m.*

the spaces between the cords. On the adapical part, the spiral cords are developed in zigzag; three thick cords may be observed at the beginning of the teleoconch, which subsequently and by the effect of the axial ribs become nodulose and reach 12-14 in number on the last half whorl between the peripheral carina and the suture; since the nodules are high, the cells that occupy the spaces between cords also are so. In the space between the carinae the axial ribs predominate over the spiral cords forming rounded cells in the interspaces.

On the last half whorl, the cords become finer and more numerous, the axial ribs are transformed into thick axial folds of triangular aspect which extend from the peripheral to the basal carina and the cells disappear. The base is very convex and bears spiral cordlets together with axial ribs and cells in the interspaces; in

the last ½ whorl there are axial folds. Umbilicus narrow and deep, limited by a thick cord which occludes it progressively by the thickening of the base of the columella. Aperture triangular, prosocline; parietal area with a thick callous coating; columella arched, thick and reflected towards the umbilicus, with a thickening at the base which forms the periumbilical cord; outer lip margin modified only by the angle corresponding to the basal carina, which prolongs it laterally.

Dimensions: the holotype is 1.5 mm in diameter.

Habitat: Bathyal species dredged in 396-411 m.

Remarks: The species is characterized by its high spire; the lower number of cords at the beginning of the teleoconch; the elevated nodules of the cords as well as the deep cells of the spaces between cords; the large axial folds of triangular aspect and the umbilicus closed by the cord generated by the thickening of the columella.

Anticlimax fastigata spec. nov. (Figures 6C, 40A-F)

Type material: Holotype MNHN 27228 (Figs. 6C, 40A-C).
Material examined: Only from the type locality.
Type locality: Papua Nueva Guinea, Lauhamug I., 4°59.4'S, 145°47.6'E, 10 m [PAPUA NIUGINI: Stn. PS20].
Etymology: The specific name alludes to the pointed end of the spire (from the Latin *fastigatus, -a, -um* which means "elevate").

Distribution: Only known from Papua Nueva Guinea, at 10 m.

Description: Shell small (<3 mm), somewhat high, strong, robust, bicarinate and umbilicate.

The protoconch measures 260-290 µm and has a little more than 1 ½ whorls. There are two distinct phases, the first, approximately ¾ of whorl, is completely smooth and the second, which is partially concealed by the teleoconch, presents randomly distributed thick tubercles.

The teleoconch has 2 whorls and two thick carinae, one peripheral and another basal, that angle the shell markedly.

Ornamentation formed by cords and spiral grooves, ribs and axial folds. The adapical part is fully covered by spiral cords of different sizes, not nodulose, developing in zigzag, with 3 cords at the beginning of the teleoconch which become 16 at the end, between the suture and the peripheral carina; some of these cords are divided into two finer ones near the lip; the space between cords, on the first whorl is occupied by oval cells that are transformed into grooves on the last whorl; next to the lip, 3-4 thick axial ribs develop irregularly in shape and very close together, thickening the outer lip and projecting the peripheral carina outward. The periphery is delimited by two strong carinae which angle the shell; between both carinae, fine spiral cordlets are developed, as well as ribs and thick undulating folds, numbering 9-10 spiral cordlets, 10 ribs and 12 thick axial folds on the last whorl.

The base is slightly convex and is covered by spiral cords which are divided into two as they approach the lip. Umbilicus narrow and deep, not limited by any carina. Aperture quadrangular, prosocline, inner and outer lips very coarse, expanded outwards; parietal area covered by a thick callous coating forming a marked angle; columella arched, very reflected towards the umbilicus and developing an extensive callous area at the base; outer lip modified by the two carinae that angle it internally and expand it outwards.

Dimensions: the holotype is 2.67 mm in diameter.

Habitat: Infralittoral species dredged at 10 m depth.

Remarks: No other studied species has the morphological characters observed in *A. fastigata*. The species is characterized by its robustness; the

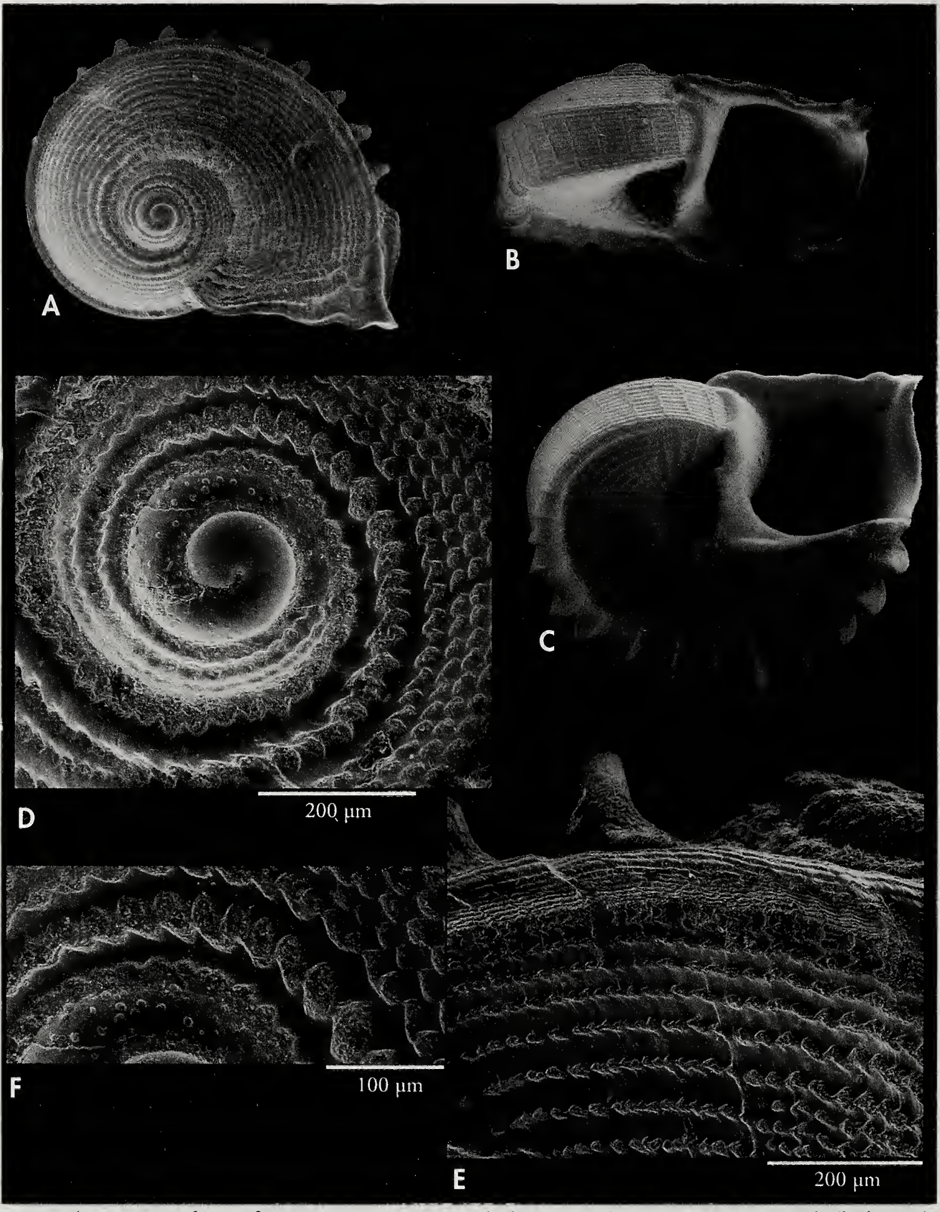


Figure 40A-F. *Anticlimax fastigata* spec. nov. A-C: holotype, 2.67 mm; D: protoconch (holotype); E-F: microsculpture. Lauhamug Island, Papua New Guinea, Stn. PS20, 10 m.
Figura 40A-F. Anticlimax fastigata *spec. nov. A-C: holotipo, 2,67 mm; D: protoconcha (holotipo); E-F: microescultura. Isla de Lauhamug, Papua Nueva Guinea, Stn. PS20, 10 m.*

strength of the carinae; the small size of its protoconch; the thick axial folds that develop between the carinae; the axial folds that develop on the adapical part, next to the lip, that project the peripheral carina outwardly; the narrow and deep umbilicus; the thick quadrangular aperture and the lips projected outwards.

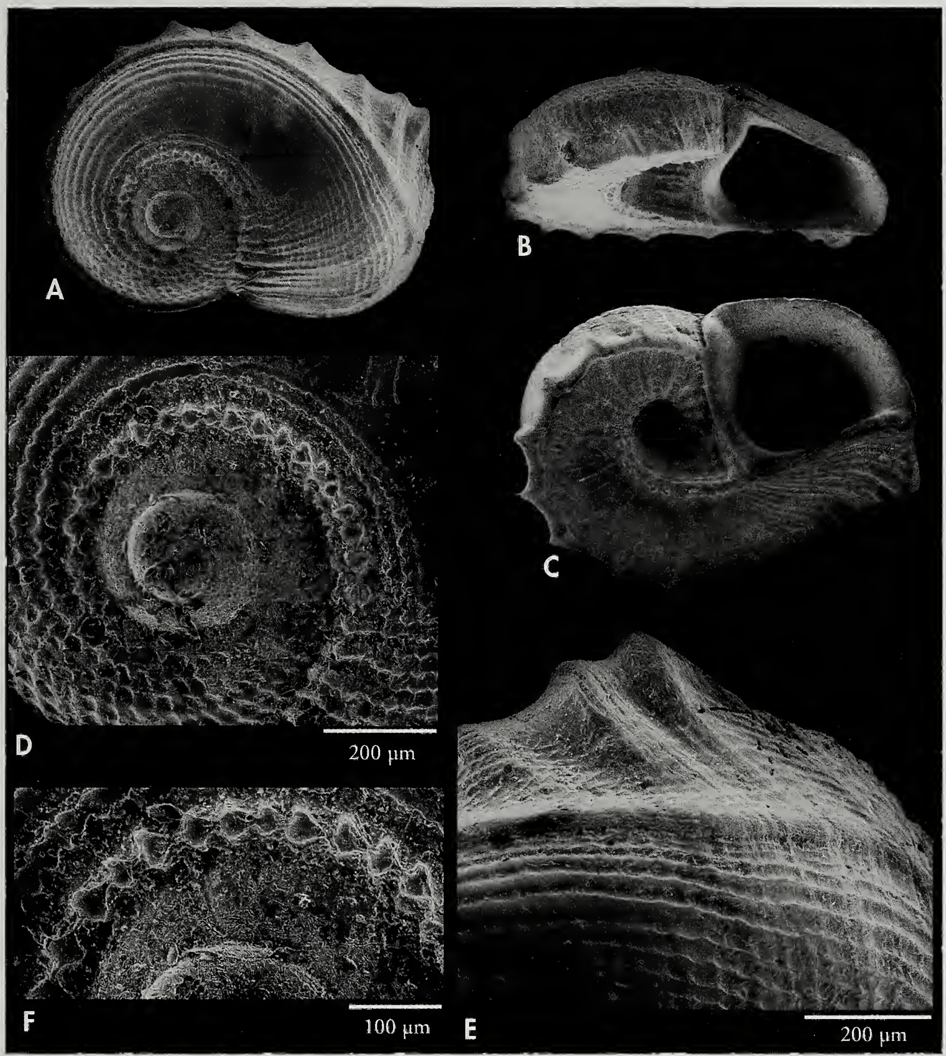


Figure 41A-F. *Anticlimax rhinoceros* spec. nov. A-C: holotype, 1.65 mm; D: protoconch of the holotype; E-F: microsculpture. W Wonad Island, Papua New Guinea, Stn. PS32, 19 m.
Figura 41A-F. Anticlimax rhinoceros *spec. nov. A-C: holotipo, 1,65 mm; D: protoconcha del holotipo; E-F: microescultura. O de la isla de Wonad, Papua Nueva Guinea, Stn. PS32, 19 m.*

Anticlimax rhinoceros spec. nov. (Figures 6D, 41A-F)

Type material: Holotype MNHN 27229 (Figs. 6D, 41A-C)
Material examined: Only from the type locality.
Type locality: Papua New Guinea, West Wonad I., 5°08.1'S, 145°49.3'E, 19 m [PAPUA NIUGINI: Stn. PS32].
Etymology: The specific name alludes to the profile in apical view, which can recall the outline of a rhinoceros.

Distribution: Only known from Papua New Guinea, at 19 m.

Description: Shell small (<2 mm), bicarinate, wider than high, formed by 3

Table IV. Differences between species of group 4.
Tabla IV: Diferencias entre las especies del grupo 4.

Species	Protoconch N° whorls	Protoconch Diam. µm	Protoconch Microsculpture	Teleoconch Periph. keels	Teleoconch Prominences in the aperture
A. textilis	2	360	small spiral threads	1	2 only incipient
A. vanuatuensis	2	310	tubercles and threads	1 only in the last half	1 very prominent on the lower part
A. levis	1 3/4	320	growth lines	1 only at the end	1 very prominent on the lower part
A. spiralis	1 1/2	250	different granules	no	2 small
A. simplex	2	380	very small tubercles	2 the upper one disappears	1 small in the lower part
A. uniformis	2 1/8	400	very small tubercles and threads	1 lower prominent	2 prominent
A. maestrati	a little more than 2	390	very small tubercles and grooves	1 only at the end	The lower prominent
A. philippinensis	a little more than 2	320-350	tubercles and growth lines	1 in lower part	The lower scarcely prominent
A. imitatrix	a little more than 2	320-350	small tubercles and growth lines	2 the lower one more prominent	Only one lower

¼ whorls separated by a shallowly marked suture, with a low spire, narrowly umbilicate.

The teleoconch has a little more than 1 whorl and 2 carinae, one peripheral and the other basal. The ornamentation is composed of spiral nodulose cords, ribs and axial folds; the spiral cords cross the axial ribs forming in the first half-whorl very nodulose cords that begin to develop in zigzag and then disappear.

Both the subsutural and periumbilical spiral cords present characteristic thick nodules. On the last whorl, from halfway down the space between carinae toward the base there are about 14 thick axial folds. These folds become thicker as the approach the basal carina. The base is almost flat and is completely decorated with thick axial ribs crossed by fine spiral cordlets.

Aperture triangular; parietal area covered by a thick callous coating, forming an angle at the junction with the outer lip; columella arched, thick and reflected towards the umbilicus, but without occluding it; outer lip with smooth, with an unmodified margin except for a marked angle near the basal carina which prolongs it laterally. Umbilicus wide and deep, allowing the previous whorls to be seen; umbilical wall straight, with spiral cords.

Dimensions: the holotype is 1.65 mm in diameter.

Habitat: Infralitoral species dredged at 19 m depth.

Remarks: *Anticlimax rhinoceros* is characterized by the nodulose cords on the first ½ whorl of the teleoconch; by the cord of thick nodules that runs next to the suture; by its flat base and the wide folds that limit the basal carina; by the periumbilical nodulose cord; by the concentration of thick folds on the basal carina, next to the outer lip, and by the great inclination of the aperture.

Other species such as *A. niasensis, A. padangensis* have a similar profile; they differ from *A. rhinoceros* spec. nov. in *A. padangensis* having less folds on the basal carina and *A. niasensis* having a thick subsutural cord of strong tubercles and another periumbilical cord with smaller tubercles.

GROUP 4

Description: Low conical spire. Teleoconch: A marked and/or prominent basal carina which angles the external lip and prolongs it laterally. Adapically rounded. Ornamentation of fine spiral grooves in zigzag. Base with light axial folds. Aperture rounded; columella not very thick and reflected. Umbilicus almost closed by a thickening of the columellar callus.

This group is formed by 9 species: *A. textilis, A. vanuatuensis, A. levis, A. spiralis, A. simplex, A. uniformis, A. maestratii, A. philippinensis* and *A. imitatrix*.

Table IV gives a useful summary of their differences.

Anticlimax textilis spec. nov. (Figures 6E, 42A-F)

Type material: Holotype MNHN 27197 (Figs. 6E, 42A-C).
Material examined: Only from the type locality.
Type locality: New Caledonia, 22°39'S, 167°10'E, 202-227 m [BATHUS 2: Stn. DW715].
Etymology: The specific name refers to the similarity of the shell microsculpture to textiles.

Distribution: Only known from New Caledonia, between 202-227 m.

Description: Shell flattened, solid, keeled at its base, formed by 3 ½ rapidly increasing whorls. Protoconch formed by 2 whorls, placed at a level higher than the teleoconch, measuring about 360 μm in diameter; it is apparently smooth, although its distal portion shows a short section which is rough with irregular threads, ending with a slight line and the change of sculpture. The teleoconch has 2 quickly increasing whorls, separated by a marked suture; a peripheral keel defines the base where there is no cord or carina. Adapical part and base of the shell both convex. At the beginning of the teleoconch there are a few spiral zigzag sulci separating a few wide cords.

On the last ½ whorl, at the base, near the basal keel, a concave area is formed which modifies the outer lip. Ornamentation composed of rather low spiral cords, wider than their interspaces, which are crossed by fine axial striae. Aperture oval, prosocline; parietal area covered by a thick callous coating; columella arched, thickened and reflected towards the umbilicus; outer lip smooth, with a sharp edge, modified by the basal keel and by a concave sinus in its basal part, which determines a characteristic angulation. Narrow and deep umbilicus which does not allow the earlier whorls to be seen, gradually closed by the thickening and reflection of the columella.

Dimensions: the holotype measures 2.09 mm in diameter.

Habitat: Bathyal species dredged at 202-227 m.

Remarks: The obvious characteristic is the presence of the teleoconch microsculpture, simple at the beginning and very fine and complex at the end.

Anticlimax textilis spec. nov. differs from *A. vanuatuensis, A. levis* and *A. spiralis*, by the carinate profile of the shell; the larger size and different ornamentation of the protoconch and the sinus in the basal part of the outer lip. *A. simplex* is distinguished by the different ornamentation of the protoconch and lacking spiral nodulose cords on the first whorl of the teleoconch. *A. uniformis* differs by having the protoconch smaller and with a different ornamentation and lacking the prominent basal keel of the teleoconch.

Anticlimax vanuatuensis spec. nov. (Figures 6F, 43A-E, 44A-E)

Type material: Holotype MNHN 27198 (Figs. 6F, 43A-C). Paratype MNHN 27199 (Figs. 44A-C) from Segond Channel, vicinity of Maritime College, Stn. LD21, 1-6 m.

Material examined: (2 s): Vanuatu, SANTO 2006: 1 s, W Tangoa Island, Stn. LD39, 15°35.4'S, 166°58.7'E, 6-9 m, fine brownish mineral sand (holotype); 1 s, Segond Channel, vicinity of Maritime College, Stn. LD21, 15°31.3'S, 167°09.9'E, 1-6 m, grey mineral sand (paratype).
Type locality: Vanuatu, W Tangoa Island, 15°35.4'S, 166°58.7'E, 6-9 m, fine brownish mineral sand [SANTO 2006: Stn. LD39].
Etymology: The specific name refers to that of the island where the species was collected.

Distribution: Only known from Vanuatu Island at 6 m.

Description: Shell very small (<1.5 mm), solid, with a rounded periphery, umbilicus small and deep, almost occluded by a columellar thickening; outer lip very prolonged laterally.

Protoconch of about 310 μm in diameter and almost 2 whorls, the first is almost smooth, and the second has thick tubercles and fragments of cords over its surface; it ends at the beginning of the sculpture of the teleoconch. This has 1 ¼ whorls of rapid growth; thick spiral cords, becoming smaller at the end and attenuated in the adapical part, develop in zigzag and cover all the shell; at the middle of the base, which is strongly convex, thick cords and axial ribs arise, ending at the umbilical edge.

The periphery is rounded and there is no carina until the last half whorl, where a moderately thick one develops, sufficient to produce a thickening and angulation of the outer lip. In the peripheral basal zone close to the outer lip, the spiral cords disappear, leaving only fine ramified lines.

Aperture rounded, forming 3 characteristic angles: one at the union of the parietal area with the outer lip; a second, at the base, formed by the columellar thickening and subsequent reflection towards the umbilicus and finally, the basal peripheral angle, which expands the aperture laterally. Umbilicus narrow and deep, almost completely occluded by the columellar callus.

Dimensions: the holotype is 1.35 mm in diameter.

Habitat: Infralittoral species dredged at 6-9 m in fine brownish mineral sand bottom (Stn. LD39) and at 1-6 m in grey mineral sand bottom (Stn. LD21).

Remarks: Its rounded periphery, the lack of thick carinae which angle the shell and the angle that expands the outer lip laterally, characterize the species.

The most similar species to *Anticlimax vanuatuensis* spec. nov. is *A. levis*, which differs by the ornamentation of the protoconch and teleoconch and by having axial folds on the base.

From *A. textilis* spec. nov. it differs in the smaller size of its protoconch; by lacking the sinus on the basal part of the outer lip and by a different ornamentation of the teleoconch; and because *A. vanatuensis* lacks a peripheral keel.

A. spiralis, A. simplex and *A. uniformis* are distinguished by the different ornamentation of the second phase of the protoconch.

A. textilis and *A. uniformis* by the lack of a basal keel. *A. simplex* for lacking spiral nodulose cords on the first whorl of the teleoconch.

A. niasensis (Thiele, 1925) has a median peripheral carina on the entire last whorl.

A. padangensis (Thiele, 1925) has a strong spiral sculpture on the adapical part.

Anticlimax levis spec. nov. (Figures 6G, 45A-D)

Type material: Holotype MNHN 27200 (Figs. 6G, 45A-B).
Material examined: Only from the type locality.
Type locality: Philippines, Bohol island, west of Baclayon, 9°35.1'N, 123°51.2'E, 34-82 m, coarse muddy sand with large sponges [PANGLAO 2004: Stn. T6].
Etymology: The specific name is from the Latin adjective *levis,-e*, which means "smooth, polished", alluding to the smooth adapical part of the greater part of the shell.

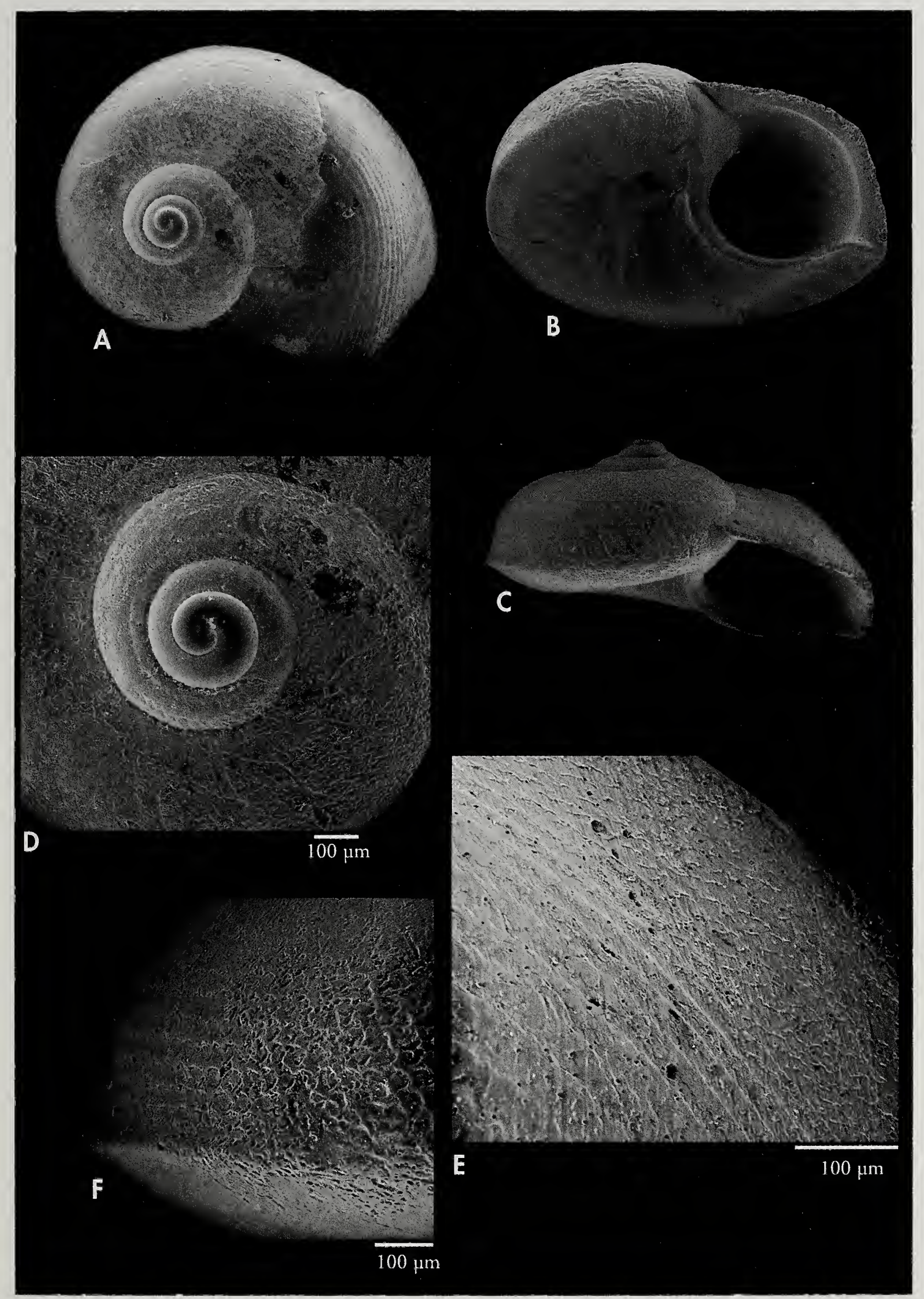


Figure 42A-F. *Anticlimax textilis* spec. nov. A-C: holotype, 2.09 mm (MNHN); D: apical view and protoconch (holotype); E-F: detail of the microsculpture. New Caledonia, BATHUS 2, Stn. DW715, 202-227 m.

Figura 42A-F. Anticlimax textilis *spec. nov. A-C: holotipo, 2,09 mm (MNHN); D: vista apical y protoconcha (holotipo); E-F: detalle de la microescultura. Nueva Caledonia, BATHUS 2, Stn. DW715, 202-227 m.*

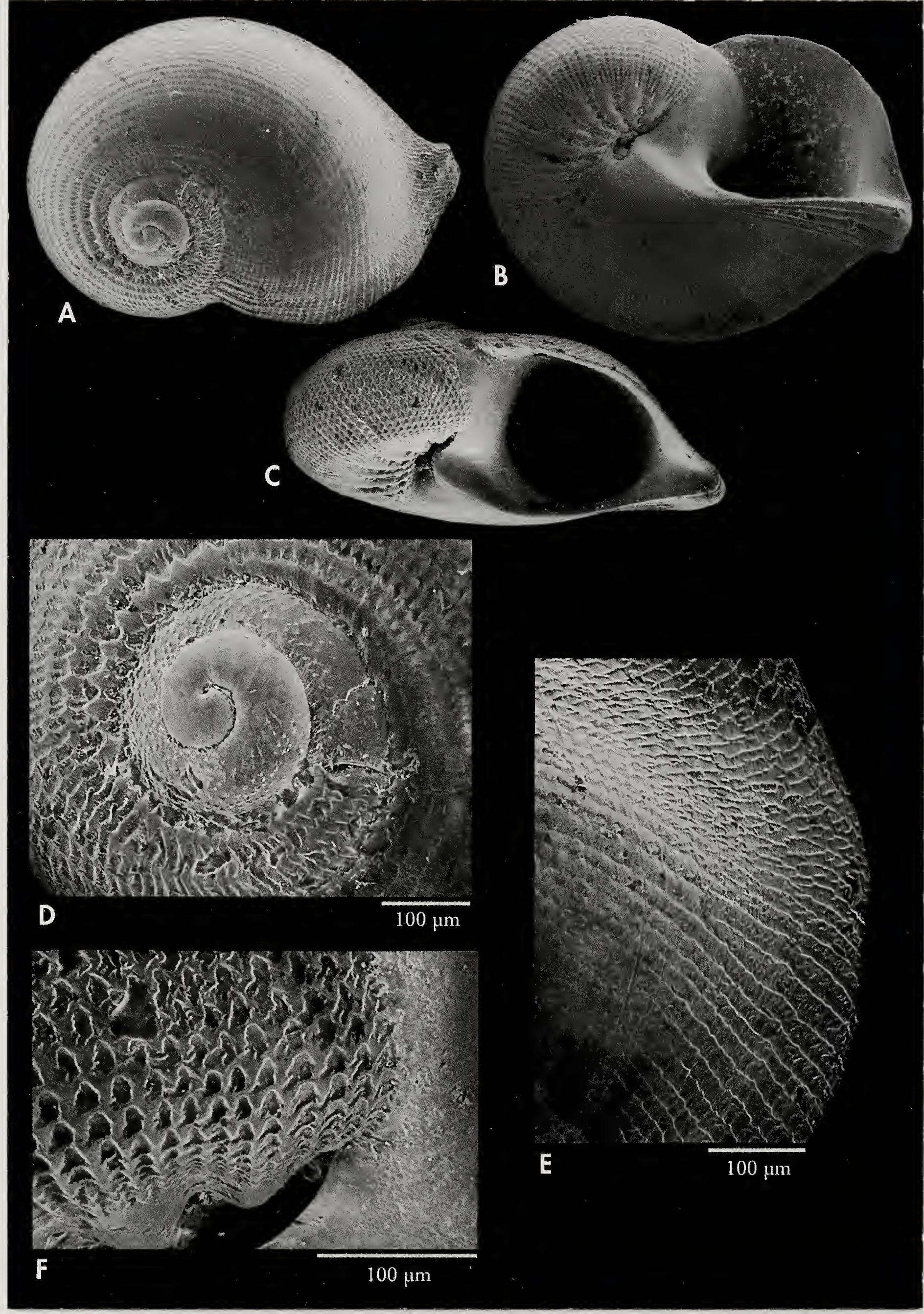


Figure 43A-F. *Anticlimax vanuatuensis* spec. nov. A-C: holotype, 1.35 mm (MNHN); D: apical view and protoconch (holotype); E-F: microsculpture. Vanuatu, W Tangoa Island, Stn. LD39, 6-9 m, muddy sand bottom.

Figura 43A-F. Anticlimax vanuatuensis *spec. nov. A-C: holotipo, 1,35 mm (MNHN); D: vista apical y protoconcha (holotipo); E-F: microescultura. Vanuatu, O de la isla Tangoa, Stn. LD39, 6-9 m, fondo arenoso y fangoso.*

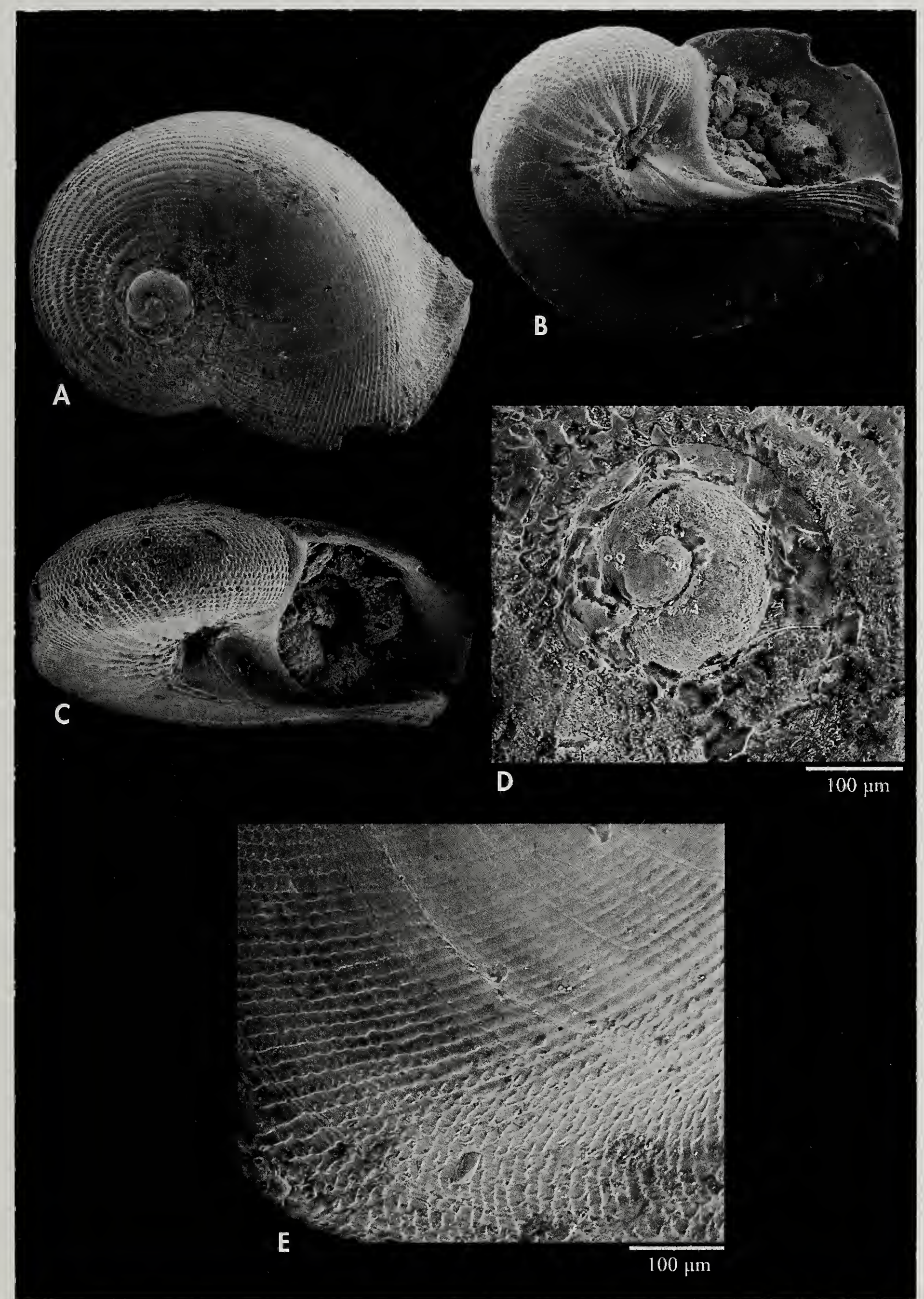


Figure 44A-E. *Anticlimax vanuatuensis* spec. nov. A-C: paratype, 1.4 mm (MNHN); D: protoconch of the same paratype; E: microsculpture. Vanuatu, Segond Channel, vicinity of Maritime College, Stn. LD21, 1-6 m, sandy bottom.

Figura 44A-E. Anticlimax vanuatuensis *spec. nov. A-C: paratipo, 1,4 mm (MNHN); D: protoconcha del mismo paratipo; E: microescultura. Vanuatu, Canal Segond, cerca del Maritime College, Stn. LD21, 1-6 m, fondo arenoso.*

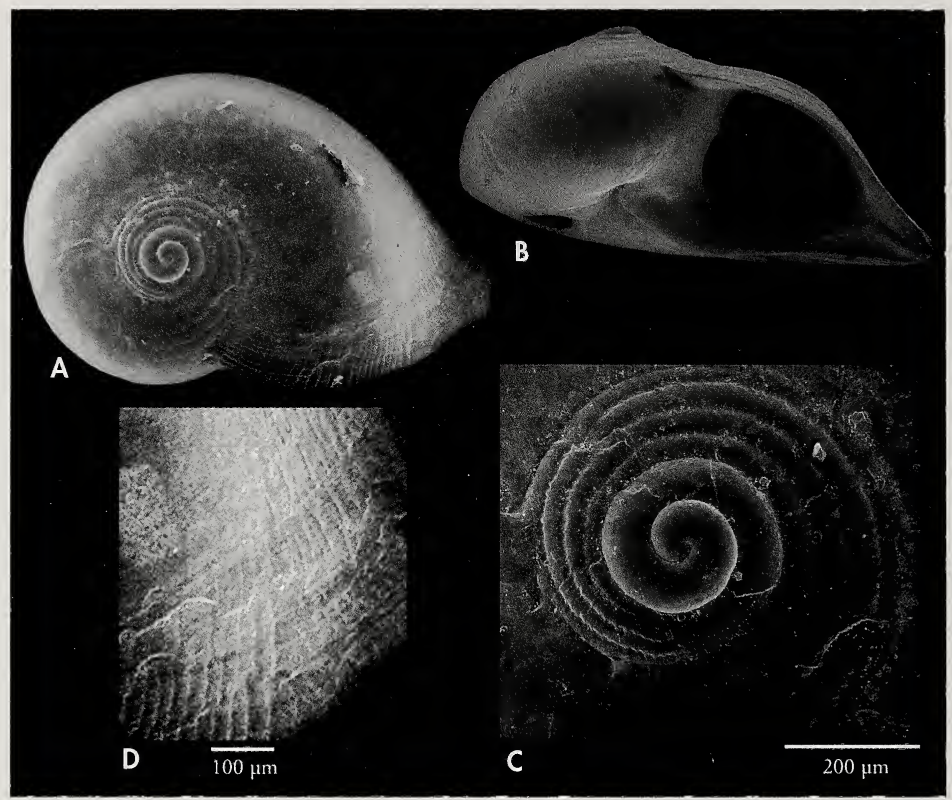


Figure 45A-D. *Anticlimax levis* spec. nov. A-B: holotype, 2.0 mm (MNHN); C: protoconch of the holotype; D: detail of the microsculpture. Philippines, Bohol Island, west of Baclayon, Stn. T6, 34-82 m, coarse muddy sand with large sponges.

Figura 45A-D. Anticlimax levis *spec. nov. A-B: holotipo, 2,0 mm (MNHN); C: protoconcha del holotipo; D: detalle de la microescultura. Filipinas, isla de Bohol, Oeste de Baclayon, Stn. T6, 34-82 m, arena gruesa fangosa con grandes esponjas.*

Distribution: Only known from the Philippines, its type locality between 34-82 m.

Description: Shell small (about 2.00 mm), solid, formed by 4 ¼ whorls of rapid growth, suture barely visible, carinate basally, with a low spire and narrowly umbilicate. The protoconch is located at a higher level than the teleoconch, measures 320 μm, has 1 ¾ whorls and 2 distinct phases; the first is completely smooth and the second bears well-marked growth lines. The teleoconch has about 2 whorls and shows a single carina in a basal position, that develops on the last half whorl. Adapical part and base very convex, periphery rounded.

On the adapical part of the first spiral whorl, 4 thick zigzagging spiral cords can be observed; the spaces between the cords are initially occupied by rhomboidal cells that change into grooves from the first quarter-whorl and disappear after the first whorl, appearing again near the aperture; more than 30 spiral cords can be counted, distributed between the suture and the basal carina. Base convex, not limited by the basal carina until the last ½ whorl; decorated with spiral cords in zigzag and rhomboid cells in the spaces between the cords, as well as marked growth-lines, which do not form ribs; on the last half whorl, the ornamentation of the

base disappears, leaving only the growth lines.

Aperture triangular, prosocline; parietal area covered by a thin callous coating; columella arched, very thick and reflected towards the umbilicus, forming in addition a very thick columellar callus which tends to close the umbilicus progressively. Outer lip thin, with smooth margin, only modified by the basal keel that angles and expands it considerably laterally. Umbilicus very narrow and deep, reduced to a narrow fissure that is almost occluded by the columellar callus.

Dimensions: the holotype is 2.00 mm in diameter.

Habitat: Infra-circalittoral species trawled between 34-82 m in coarse muddy sand with large sponges.

Remarks: The species with which *A. levis* spec. nov. has most similarity is *A. vanuatuensis*, distinguished by the different ornamentation of the second phase of the protoconch; by the different and less distinctive ornamentation of the adapical part and the base of the teleoconch and by the lack of axial folds on the base.

From *Anticlimax maestratii* spec. nov. it is distinguished by the smaller size of the protoconch and the lack of grooves in its second phase; because the spiral cords disappear from the first whorl of the teleoconch and on the adapical part , appearing again close to the outer lip; finally, by the not so rounded aperture and a much larger columellar callus.

From *Anticlimax philippinensis* spec. nov. it differs by lacking tubercles in phase two of the protoconch; by the less open umbilicus and the much more developed columellar callus and because the spiral cords disappear from the first whorl of the teleoconch and on the adapical part , appearing again near the outer lip.

From *A. textilis* spec. nov. and *A. uniformis* spec. nov. it may be distinguished by the distinct shape of the outer lip. From *A. simplex* by lacking spiral nodulose cords on the first whorl of the teleoconch.

A. niasensis (Thiele, 1925) has a peripheral carina in the middle over the entire last whorl. *A. padangensis* (Thiele, 1925) has a strong spiral sculpture on the adapical part.

Anticlimax spiralis spec. nov. (Figures 6H, 46A-F)

Type material: Holotype MNHN 27201 (Figs. 6H, 46A-C)
Material examined: Only from the type locality.
Type locality: Vanuatu, Coolidge wreck, Segond Channel, 15°31.4'S, 167°14.1'E, 20-31 m [SANTO 2006: Stn. FS54].
Etymology: The specific name refers to the faint spiral microsculpture existent on the teleoconch.

Distribution: Only known from Vanuatu, between 20-31 m.

Description: Shell small (<2.5 mm), depressed, with about 4 whorls of rapid growth, separated by a thin suture; with a low spire, and the umbilicus very narrow and deep.

Protoconch with 1 ½ apparently smooth whorls, measuring about 250 µm, and showing two phases: the first is completely smooth and the second presents granules of different sizes scattered randomly. The end is very evident by the change to the sculpture of the teleoconch. This has 2 ½ whorls; on the first whorl there are thick zigzagging spiral cords, wider than their interspaces; on subsequent whorls these cords disappear completely from the adapical part and the base, remaining only at the periphery; marked growth lines can be observed. The adapical part, the periphery and the base are convex.

There are no carinae or peripheral keels; only on the last quarter whorl, two slight peripheral angulations which modify the aperture appear, one adapical and the other basal. Aperture quadrangular, prosocline. The parietal area is covered by a thick callous coating and forms an angle with the outer lip; columella very thick, widened at the base and reflected towards the umbilicus, forming a callus which occludes it pro-

gressively; outer lip with a smooth margin, modified by two angles corresponding to the peripheral carinae. Umbilicus narrow and deep, progressively occluded by the thickened columellar callus; there is no periumbilical cord, only marked growth lines that penetrate inside and that together form rough and irregular umbilical folds.

Dimensions: the holotype is 2.44 mm in diameter.

Habitat: Infralittoral species found in sediments collected between 20-31 m.

Remarks: The species is characterized by the lack of spiral cords on the adapical part and the base of the last 1 ½ whorls; the lack of obvious peripheral carinae; the angles on the outer lip that correspond to these carinae and the columellar callus that gradually occludes the umbilicus, very similar to the species of *Solariorbis*.

Anticlimax spiralis spec. nov. differs from the remaining species of the group by the smaller size of its protoconch. *A. textilis, A. simplex, A. uniformis* and *A. philippinensis* differ by lack of evident peripheral or basal keels. *A. vanuatuensis, A. levis* and *A. maestratii* have 2 angles inside the outer lip.

Anticlimax simplex spec. nov. (Figures 6I, 47A-E)

Type material: Holotype MNHN 27202 (Figs. 6I, 47A-C).
Material examined: Only from the type locality.
Type locality: Vanuatu, 16°16'S, 167°21'E, 360-419 m [MUSORSTOM 8: Stn. DW1065].
Etymology: The specific name alludes to the scarce number of remarkable details of the shell.

Distribution: Only known from Vanuatu, its type locality, between 360-419 m.

Description: Shell small (about 2 mm), solid, formed by 3 ½ whorls of rapid growth, suture barely visible, carinate basally; with a low spire and narrowly umbilicate.

Protoconch with about 2 whorls and measuring about 380 μm; the first 1 ¼ whorls are completely smooth, the rest shows axial growth lines, more visible near the suture and numerous granules that are arranged at the periphery; the protoconch ends with an evident change of the sculpture. Teleoconch with a little less than 2 whorls; at the end of the spire 2 peripheral carinae can be seen, one in prolongation of the suture and the other basal; the former one disappears over the last ¾ whorl, leaving the basal more prominent, like a small keel. On the adapical part of the first whorl there are thick zigzagging spiral cords forming thick nodules; over the last half whorl they gradually fade until almost disappearing from the whorl, with the spiral cords remaining only on the periphery of the shell.

Base convex, periphery initially flat, later convex; in its first ¼ whorls there are spiral cordlets which disappear completely covered by a thin callous layer. Aperture oval, prosocline; parietal area covered by a thick callous coating; columella arched, thickened and reflected towards the umbilicus, forming a columellar callus which tends to progressively close the umbilicus. Outer lip thin, smooth, single margin modified by the peripheral carina which angles and expands it laterally. Umbilicus very narrow and deep, partially occluded by the columellar callus.

Dimensions: the holotype is 2.00 mm in diameter.

Habitat: Bathyal species dredged on the slope in deep bottom between 360-419 m.

Remarks: This species may be distinguished from other congeners by the nodulose cords in zigzag from the first whorl of the teleoconch; the presence over ¾ of the last whorl of a basal keel; the very narrow umbilicus, almost occluded by the columellar callus; the shape of the outer lip expanded externally.

Anticlimax simplex spec. nov. may be distinguished from *A. vanuatuensis, A. levis, A. spiralis, A. textilis, A. philippinensis* and *A. uniformis* by the spiral nodulose cords on the first whorl of the teleoconch. From *A. maestratii* by lacking the fine spiral grooves on phase two of the protoconch.

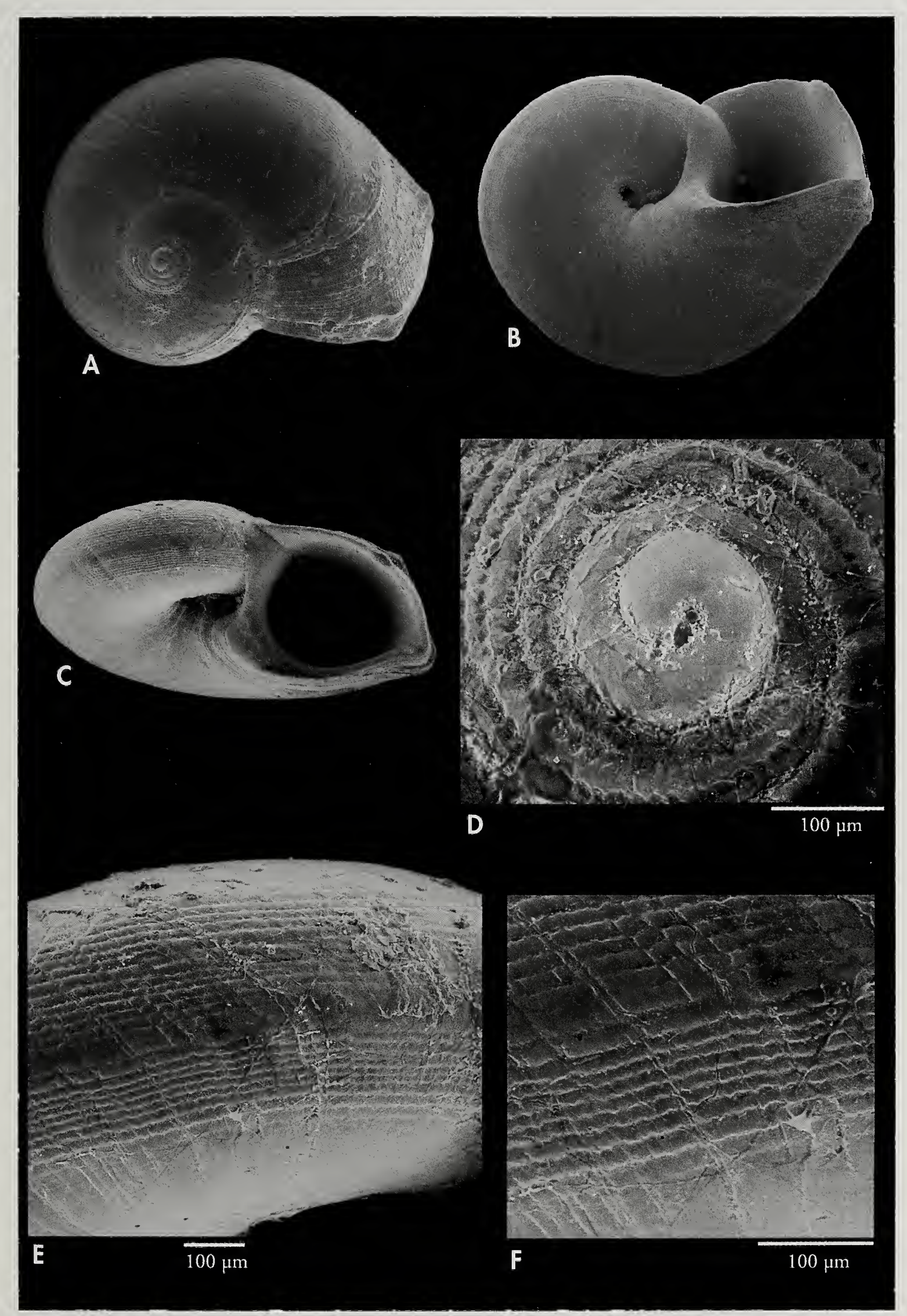


Figure 46A-F. *Anticlimax spiralis* spec. nov. A-C: holotype, 2.44 mm (MNHN); D: protoconch (holotype); E-F: microsculpture. Vanuatu, Segond Channel, Coolidge wreck, Stn. FS54, 20-31 m.
Figura 46A-F. Anticlimax spiralis *spec. nov. A-C: holotipo, 2,44 mm (MNHN); D: protoconcha (holotipo); E-F: microescultura. Vanuatu, Canal Segond, pecio del Coolidge, Stn. FS54, 20-31 m.*



Figure 47A-E. *Anticlimax simplex* spec. nov. A-C: holotype, 2.0 mm MNHN; D: protoconch (holotype); E: microsculpture. Vanuatu, MUSORSTOM 8, Stn. DW1065, 360-419 m.
Figura 47A-E. Anticlimax simplex *spec. nov. A-C: holotipo, 2,0 mm MNHN; D: protoconcha (holotipo); E: microescultura. Vanuatu, MUSORSTOM 8, Stn. DW1065, 360-419 m.*

Anticlimax uniformis spec. nov. (Figures 7A, 48A-G)

Type material: Holotype MNHN 27203 (Figs. 7A, 48A-B) and 13 paratypes MNHN 27204 (Fig. 48C).
Material examined: (21 s): Philippines, PANGLAO 2004: 14 s, between Panglao and Pamilacan Islands, Stn. T27, 9°33′N, 123°51′E, 106-137 m, fine sand and mud with echinoderms (type material); 3 s, Panglao Island, Bolod, Stn. T2, 9°32.4′N, 123°47.8′E, 152 m, coarse sand; 2 s, Panglao Island, off San Isidro, Stn. T10, 9°33.4-33.8′N, 123°49.5-50.5′E, 117-124 m, mud and fine sand; 2 s, Bohol Island, west of Baclayon, Stn. T5, 9°35.3′N, 123°52.2′E, 84-87 m, coarse muddy sand.

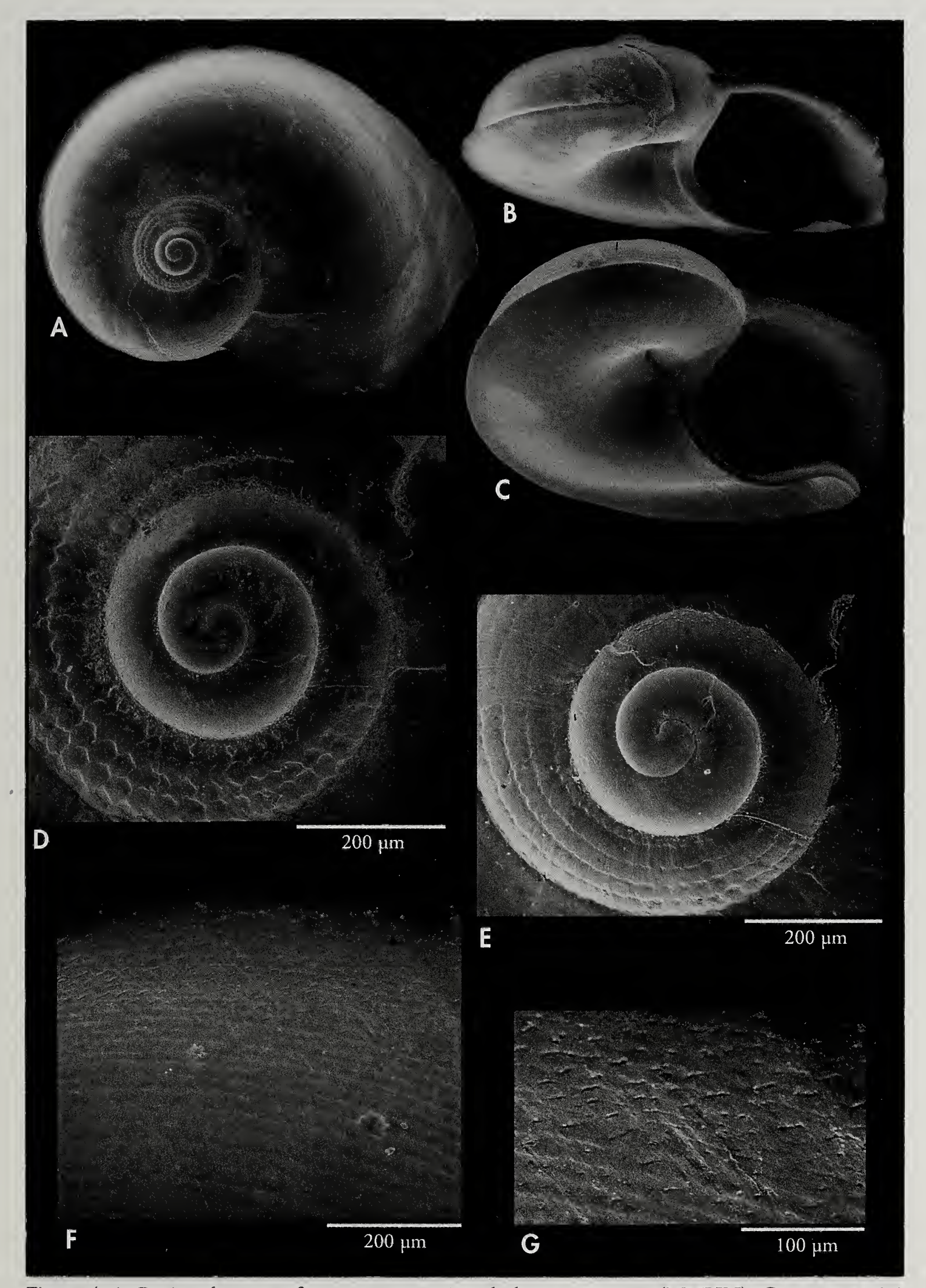


Figure 48A-G. *Anticlimax uniformis* spec. nov. A-B: holotype, 3.0 mm (MNHN); C: paratype, 3.2 mm (MNHN); D: protoconch of the holotype; E: protoconch of the paratype; F-G: microsculpture and detail. Philippines, between Panglao and Pamilacan Islands, Stn. T27, 106-137 m.
Figura 48A-G. Anticlimax uniformis *spec. nov. A-B: holotipo, 3,0 mm (MNHN); C: paratipo, 3,2 mm (MNHN); D: protoconcha del holotipo; E: protoconcha del paratipo; F-G: microescultura y detalle. Filipinas, entre las islas de Panglao y Pamilacán, Stn. T27, 106-137 m.*

Type locality: The Philippines, between Panglao and Pamilacan Islands, 9°33.4'N, 123°51.0'E, 106-137 m, fine sand and mud with echinoderms [PANGLAO 2004: Stn. T27].
Etymology: The specific name makes reference to the uniformity of the sculpture on the dorsum of the last whorl, in opposition to other species of the group which have smooth areas.

Distribution: Only known from the Philippines, between 87 and 152 m.

Description: Shell small (about 3 mm), solid, formed by 3 ½ whorls of rapid growth with a suture barely visible; carinate basally; with a low spire and narrowly umbilicate.

The protoconch measures about 400 μm and has 2 $^1/_8$ whorls of spire and 2 distinct phases; the first is completely smooth while on the second, there are axial growth-lines, more visible next to the suture and numerous micro granules that are arranged near the periphery. The teleoconch has about 2 whorls; it shows a single, very prominent basal carina, and a small keel, on which there are small oblique incisions. Adapical area and base are convex. On the adapical part of the first whorl of the spire, 4-5 thick zigzagging spiral cords can be seen, as well as spaces between cords occupied initially by rounded cells and, after the first ½ whorl, by grooves; on the last whorl the cords are much finer and more numerous, with more than 40 cords between the suture and the basal carina on the last quarter.

Base convex, totally smooth, without ornamentation except for fine growth lines. Aperture triangular, prosocline; parietal callous area covered by a thin layer; columella arched, thickened and reflected towards the umbilicus, forming a columellar callus which tends progressively to close the umbilicus. Outer lip thin, margin smooth, only modified by a basal keel that angles and expands it laterally. Umbilicus very narrow and deep, partially occluded by the columellar callus.

Dimensions: the holotype is 3.00 mm in diameter.

Habitat: Circalittoral species trawled at 152 m in coarse sand bottom (Stn. T2); at 84-87 m in coarse muddy sand bottom (Stn. T5); at 117-124 m in fine muddy sand bottom (Stn. T10) and at 106-152 m in fine sand and mud with echinoderms (Stn. T27).

Remarks: Characteristics of the species are the non-nodulose spiral cords seen on the adapical part of the shell and a completely smooth base, without ornamentation except for fine growth lines.

Anticlimax uniformis spec. nov. differs from *A. vanuatuensis*, *A. levis*, *A. spiralis*, *A. textilis* and *A. philippinensis*, by the larger size of its protoconch; from *A. simplex* because it lacks spiral nodulose cords on the first whorl of the teleoconch. From *A. maestratii* spec. nov. it differs in having a prominent basal keel and small tubercles rather than fine spiral grooves on phase two of the protoconch.

Anticlimax maestratii spec. nov. (Figures 7B, 49A-E, 50A-E)

Type material: Holotype MNHN 27205 (Figs. 7B, 49A) and 18 paratypes (MNHN 27206) (Fig. 49B-C).
Material examined: (34 s): Philippines, PANGLAO 2004: 1 s, between Panglao and Pamilacan Islands, Stn. T27, 9°33'N, 123°51'E, 106-137 m, fine sand and mud with echinoderms (Fig. 50); 1 s, Panglao Island, Bolod, Stn. T4, 9°33.0'N, 123°48.5'E, 82 m, many large sponges; 4 s, Bohol Island, west of Baclayon, Stn. T7, 9°36.1'N, 123°53.3'E, 61-62 m, fine muddy sand; 8 s, Bohol Island, west of Baclayon, Stn. T5, 9°35.3'N, 123°52.2'E, 84-87 m, coarse muddy sand; 19 s, Panglao Island, off San Isidro, Stn. T9, 9°33.5'N-9°33.9'N, 123°49.5'-123°50.5'E, 97-120 m, fine sand with seagrass (type material); 1 s, Bohol Island, Cortes, Stn. T18, 9°41.8'N, 123°49.9'E, 80-100 m, muddy bottom with sponges.
Type locality: The Philippines, Panglao Island, off San Isidro, Exp. 9°33.5-33.9'N, 123°49.5-50.5'E, 97-120 m [PANGLAO 2004: Stn. T9].
Etymology: The species name is after Philippe Maestrati, member of the Malacology staff of the MNHN, for his cooperation in the selection of material.

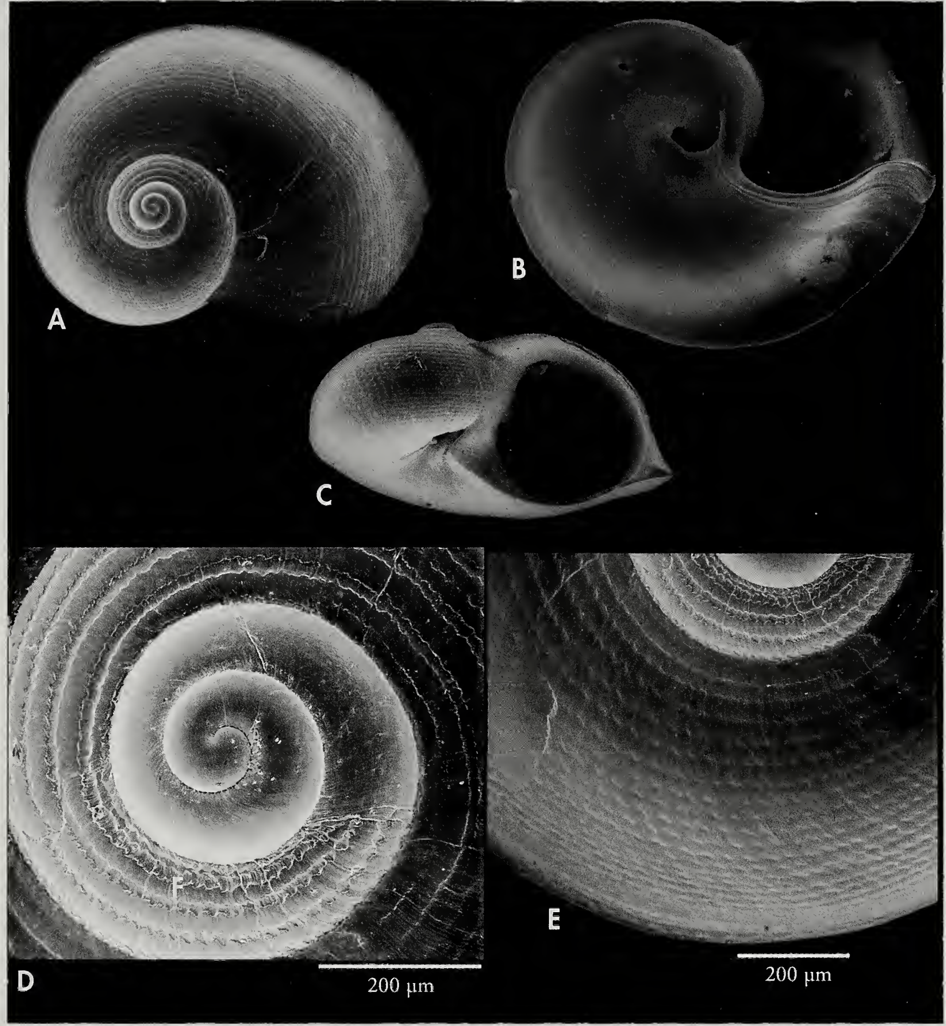


Figure 49A-E. *Anticlimax maestratii* spec. nov. A: holotype, 2.6 mm (MNHN); B-C: paratypes, 2.7, 2.0 mm; D: protoconch (holotype); E: microsculpture. Philippines, Panglao Island, off San Isidro, Stn. T9, 97-120 m.

Figura 49A-E. Anticlimax maestratii *spec. nov. A: holotipo, 2,6 mm (MNHN); B-C: paratipos, 2,7, 2,0 mm; D: protoconcha (holotipo); E: microescultura. Filipinas, Isla de Panglao, frente a San Isidro, Stn. T9, 97-120 m.*

Distribution: Only known from the Philippines, between 62 and 106 m.

Description: Shell small (<3.00 mm), solid, formed by 4 ¼ whorls of rapid growth, suture barely visible, carinate basally; with a low spire and narrowly umbilicate. The protoconch is located at a higher level than the teleoconch, measures about 390 μm, and has little more than 2 whorls and 2 distinct phases; the first is completely smooth and the second shows 3-4 very light spiral grooves, small scattered granules which are situated close to the suture and growth lines. The teleoconch has about 2 whorls and shows a single carina, in a basal position, that is more developed over the last quarter whorl. Adapical



Figure 50A-E. *Anticlimax maestratii* spec. nov. A-C: shell, 1.9 mm (MNHN); D: protoconch, from the shell figs. A-C; E: microsculpture. Philippines, between Panglao and Pamilacan Islands, Stn. T27, 106-137 m, fine sand and mud with echinoderms.

Figura 50A-E. Anticlimax maestratii *spec. nov. A-C: concha, 1,9 mm (MNHN); D: protoconcha, de la concha de la fig. A-C; E: microescultura. Filipinas, entre las islas Panglao y Pamilacán, Stn. T27, 106-137 m, en arena fina y fango con equinodermos.*

part and base very convex, rounded at the periphery.

On the adapical part of the first whorl, 3-4 thick zigzagging spiral cords can be seen; the spaces between cords are occupied initially by rhomboidal cells, changed into grooves after the first ½ whorl; on the last ½ whorl the cords are much finer and more numerous, with a space appearing near the suture where both cords and grooves disappear. Base convex, ornamented with

spiral cords in zigzag and rhomboid cells in the spaces between the cords, as well as marked growth lines, not forming ribs; on the last half whorl, the ornamentation of the base disappears, leaving only the growth lines which penetrate into the umbilicus.

Aperture triangular, very convex, prosocline; parietal area covered by a thin callous coating; columella arched, very thick and reflected towards the umbilicus forming in addition a thick columellar callus which tends progressively to close the umbilicus. Outer lip thin, with smooth margin, only modified by the basal keel which angles and expands it laterally. Umbilicus very narrow and deep, reduced to a narrow fissure that is almost occluded by the columellar callus.

Dimensions: the holotype is 2.60 mm in diameter.

Habitat: Circalittoral species, trawled at 82 m on bottom with many large sponges (Stn. T4); at 84-87 m in coarse muddy sand bottom (Stn. T5); at 61-62 m in fine muddy sand bottom (Stn. T7); at 97-120 m on fine sand with seagrass bottom; at 80-100 m, muddy bottom with sponges (Stn. T18) and at 106-137 m in fine sand and mud bottom with echinoderms (Stn. T27).

Remarks: *Anticlimax maestratii* spec. nov. is very similar in shape to *A. levis* spec. nov. from which it differs by the smaller size of its protoconch; by showing small tubercles and several spiral grooves in phase two of the protoconch; and by having the whole adapical part of the teleoconch covered by spiral cords and having a much more oblong aperture.

From *A. philippinensis* spec. nov. it is distinguished by the larger size of its protoconch; by having the same number of whorls with spiral grooves in phase two of the protoconch; and because its basal carina develops only on the last ½ whorl.

Anticlimax maestratii spec. nov may be distinguished from *A. textilis*, *A. vanuatuensis*, *A. levis* and *A. spiralis* by the larger size of its protoconch and by having fine spiral grooves in its second phase. *A. simplex* differs by lacking spiral nodulose cords on the first whorl of the teleoconch. *A. uniformis* differs by lacking a prominent basal carina.

Anticlimax philippinensis spec. nov. (Figures 7C, 51A-E, 52A-F)

Type material: Holotype MNHN 27207 (Figs. 7C, 51A-B) and 1 paratype MNHN 27208 (Fig. 51C).
Material examined: (17 s): Philippines, PANGLAO 2004: 10 s, Bohol Island, west of Baclayon, 9°35.1'N, 123°51.2'E, 34-82 m, coarse muddy sand with large sponges; 1 s, Bohol Island, Baclayon, Stn. T33, 9°36.0'N, 123°53.7'E, 67-74 m, sand with sponges (Fig. 52); 3 s, Bohol Island, Cortes, Stn. T18, 9°41.8'N, 123°49.9'E, 80-100 m, muddy bottom with sponges. PANGLAO 2005: 2 s, Balicasag Island, Dipolog Bay, Stn. CP2378, 8°38.8'N, 123°20.1'E, 63-65 m, muddy sand bottom with sponges (type material); 1 s, Panglao Island, Bolod, Stn. T1, 9°32'N, 123°47'E, 83-102 m, mud and many sponges.
Type locality: The Philippines, Balicasag Island, Dipolog Bay, 8°38.8'N, 123°20.1'E, 65 m, muddy sand bottom with sponges [PANGLAO 2004: CP2378].
Etymology: The specific name is after the archipelago where the species was found.

Distribution: Only known from the Philippines, between 34 and 83 m.

Description: Shell small (<2.00 mm), solid, formed by 3 ½ whorls growing rapidly, with a barely visible suture; carinate basally, with a low spire and narrowly umbilicate. The protoconch is located at a higher level than the teleoconch, measures 320-350 μm, and has a little more than 2 whorls and 2 distinct phases; the first is completely smooth and in the second, there are small scattered granules which are situated close to the suture, as well as growth lines. The teleoconch is approximately 1 ½ whorls; it shows only a single carina, in a basal position, that develops on the last whorl. Adapical area and base very convex.

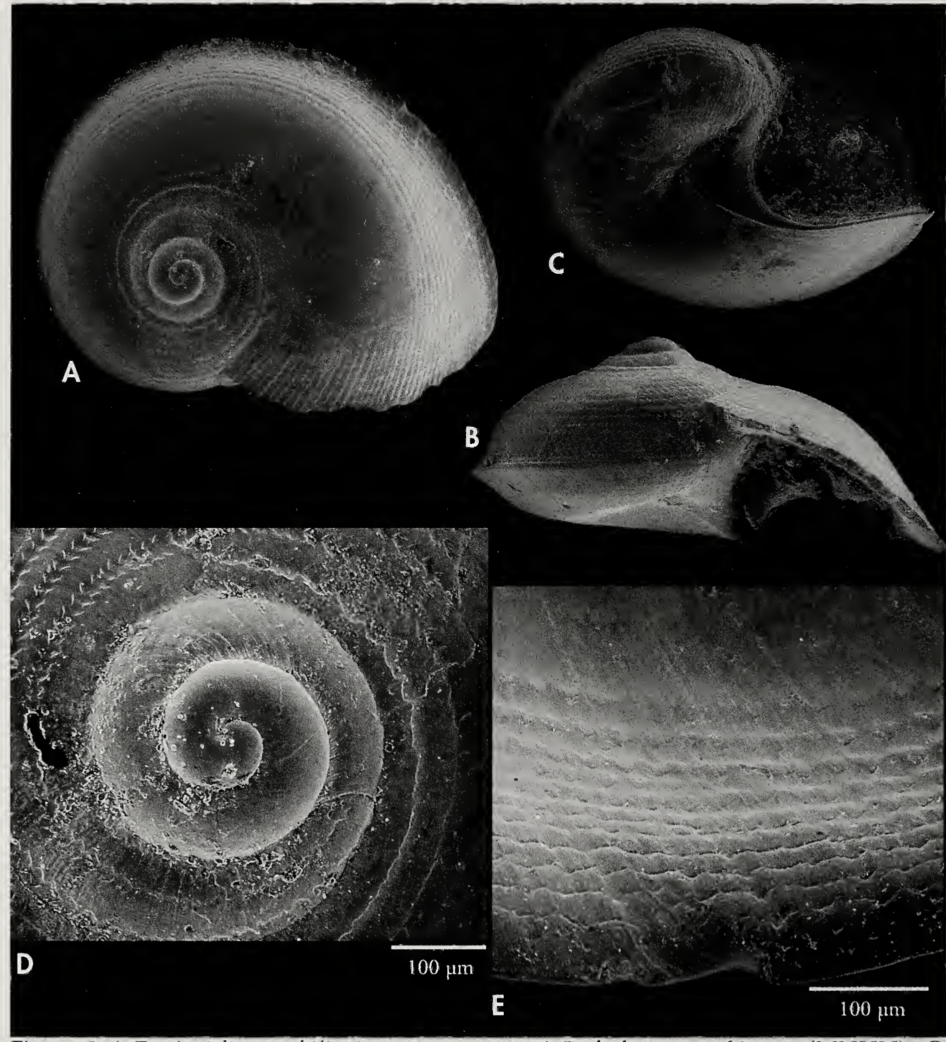


Figure 51A-E. *Anticlimax philippinensis* spec. nov. A-B: holotype, 1.65 mm (MNHN); C: paratype, 1.33 mm (MNHN); D: protoconch of the holotype; E: detail of the microsculpture. Philippines, Balicasag Island, PANGLAO 2005, Stn. CP2378, 65 m, sand and muddy bottom with sponges.

Figura 51A-E. Anticlimax philippinensis *spec. nov. A-B: holotipo, 1,65 mm (MNHN); C: paratipo, 1,33 mm (MNHN); D: protoconcha del holotipo; E: detalle de la microescultura. Filipinas, Isla de Balicasag, PANGLAO 2005, Stn. CP2378, 65 m, fondo de arena y fango con esponjas.*

On the adapical part of the first spiral whorl 3 thick, zigzagging, spiral cords can be observed; the spaces between the cords, occupied initially by rhomboidal cells and, after the first half whorl, by grooves; in the last ½ whorl, the cords are more numerous, with more than 20 between the suture and the basal carina. Base convex; in an apertural view, 10-11 spiral cords and quadrangular cells can be seen in the interspaces of the first quarter of the last whorl; the rest is completely smooth except for marked growth lines.

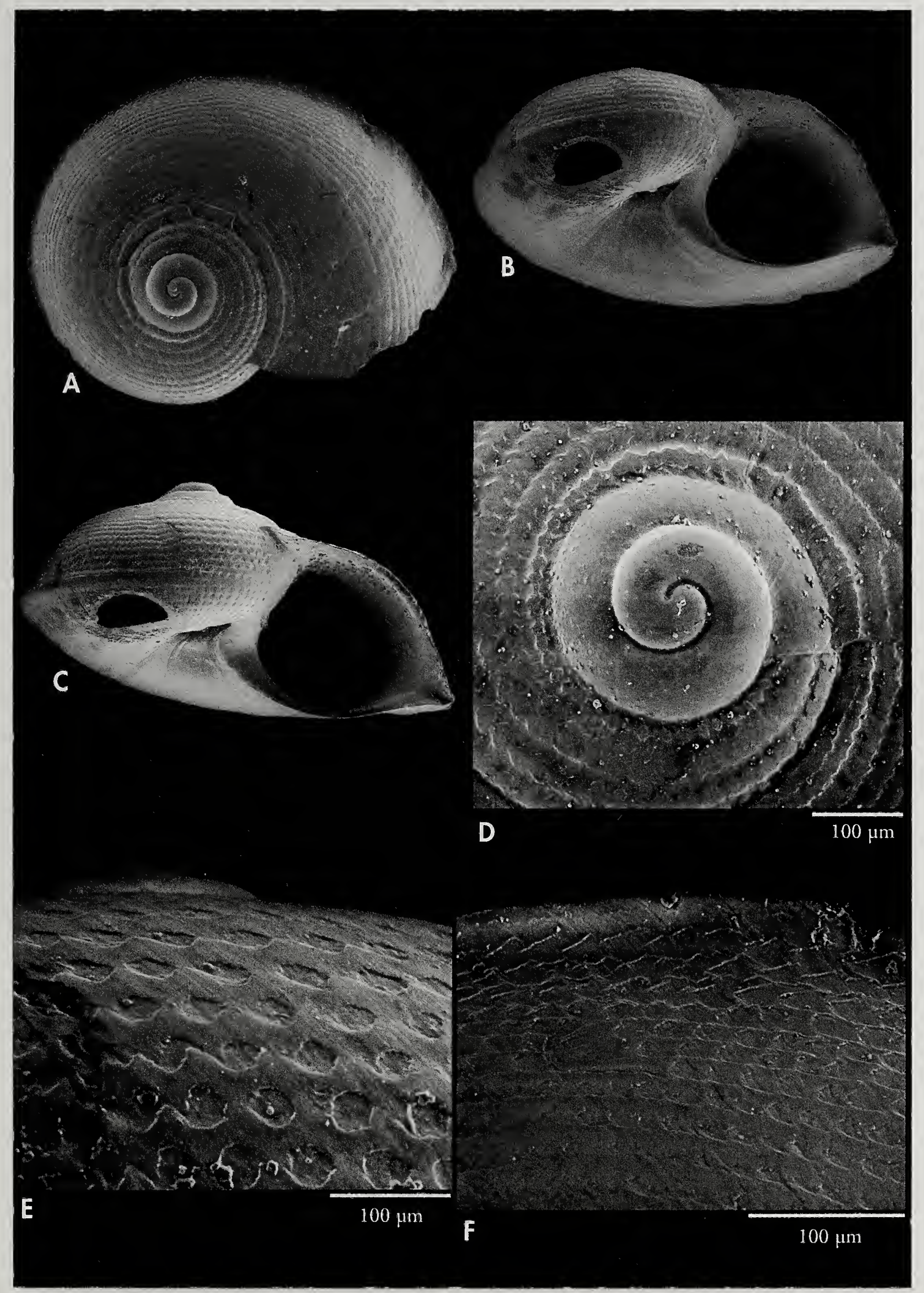


Figure 52A-F. *Anticlimax philippinensis* spec. nov. A-C: shell, 1.47 mm; D: protoconch (shell of Figs. A-C); E-F: microsculpture. Philippines, Bohol Island, Baclayon, PANGLAO 2004, Stn. T33, 67-74 m, sand with sponges.

Figura 52A-F. Anticlimax philippinensis *spec. nov. A-C: concha, 1,47 mm; D: protoconcha (de la concha de las Figs. A-C)); E-F: microescultura. Filipinas, Isla de Bohol, Baclayon, PANGLAO 2004, Stn. T33, 67-74 m, arena con esponjas.*

Aperture triangular, prosocline; parietal area covered by a thin callous coating; columella arched, very thick and reflected towards the umbilicus, forming in addition a thick columellar callus which tends to close progressively the umbilicus. Outer lip thin, with a smooth margin, only modified by the basal keel which angles and expands it laterally. Umbilicus very narrow and deep, reduced to a fissure that is almost occluded by the columellar callus.

Dimensions: the holotype is 1.65 mm in diameter.

Habitat: Circalittoral species trawled at 67-74 m in sand with sponges bottom (Stn. T33) and at 63-65 m in muddy sand bottom with sponges; at 34-82 m, in coarse muddy sand with large sponges (Stn. T6); at 83-102 m, mud and many sponges (Stn. T1); at 80-100 m, muddy bottom with sponges (Stn. T18).

Remarks: From *Anticlimax maestratii* spec. nov., *A. philippinensis* may be distinguished by the smaller size of the protoconch and by the lack of spiral grooves on its phase two; also because the basal carina is developed on the last whorl and by having a wider umbilicus.

A. levis spec. nov. differs by having the adapical part of the teleoconch fully covered by spiral cords; because the basal carina is developed on the last whorl; by having a less prominent columellar callus and a more open umbilicus.

Anticlimax imitatrix spec. nov. (Figures 7D, 53A-D)

Type material: Holotype MNHN 27230 (Figs. 7D, 53A-B).
Material examined: Only the type material.
Type locality: Solomon Islands, 9°37'S, 160°42'E, 435-461 m [SALOMON 1: Stn. CP1858].
Etymology: The specific name alludes to the similarity with the morphology of other species.

Distribution: Only known from the Solomon Islands, its type locality, between 435-461 m.

Description: Shell very small (<1.5 mm), strong, bicarinate; with a relatively high spire and narrowly umbilicate. The protoconch measures about 330 μm, with a little more than 2 whorls and 2 distinct phases; the first is completely smooth and the second apparently smooth, but bears fine growth lines near the suture and tiny scattered tubercles. The teleoconch has 1 ½ whorls and two carinae which angle the shell, one peripheral and the other basal. The peripheral carina is attenuated near the outer lip and does not modify or angle it.

The ornamentation is composed of spiral cords, axial folds and cells of different shape in the spaces between the cords. On the adapical part, the spiral cords are wide and zigzagging on the first half whorl, becoming flattened nodules on the following ½ whorl, to become smooth again on the last half whorl. At the beginning of the teleoconch 3 thick cords can be seen; 15 in the last half whorl between the peripheral carina and the suture. In the space between the carinae there are 8-9 spiral cordlets and small axial folds that disappear on the last whorl, keeling the basal carina and angling the outer lip.

The base is convex and on it spiral cordlets, axial ribs and cells in the interspace can be seen.

Umbilicus narrow and deep, limited by a large cord caused by the thickening of the base of the columella, occluding it progressively. Aperture triangular, prosocline; parietal area callous with a thick layer; columella arched, thick and reflected towards the umbilicus, with, at its base, a cord-like thickening that occludes that umbilicus; outer lip margin modified only by the angle corresponding to the basal carina, which prolongs it laterally.

Dimensions: the holotype is 1.3 mm in diameter.

Habitat: Bathyal species dredged at 435-461 m.

Remarks: The species is characterized by its small size in comparison with the

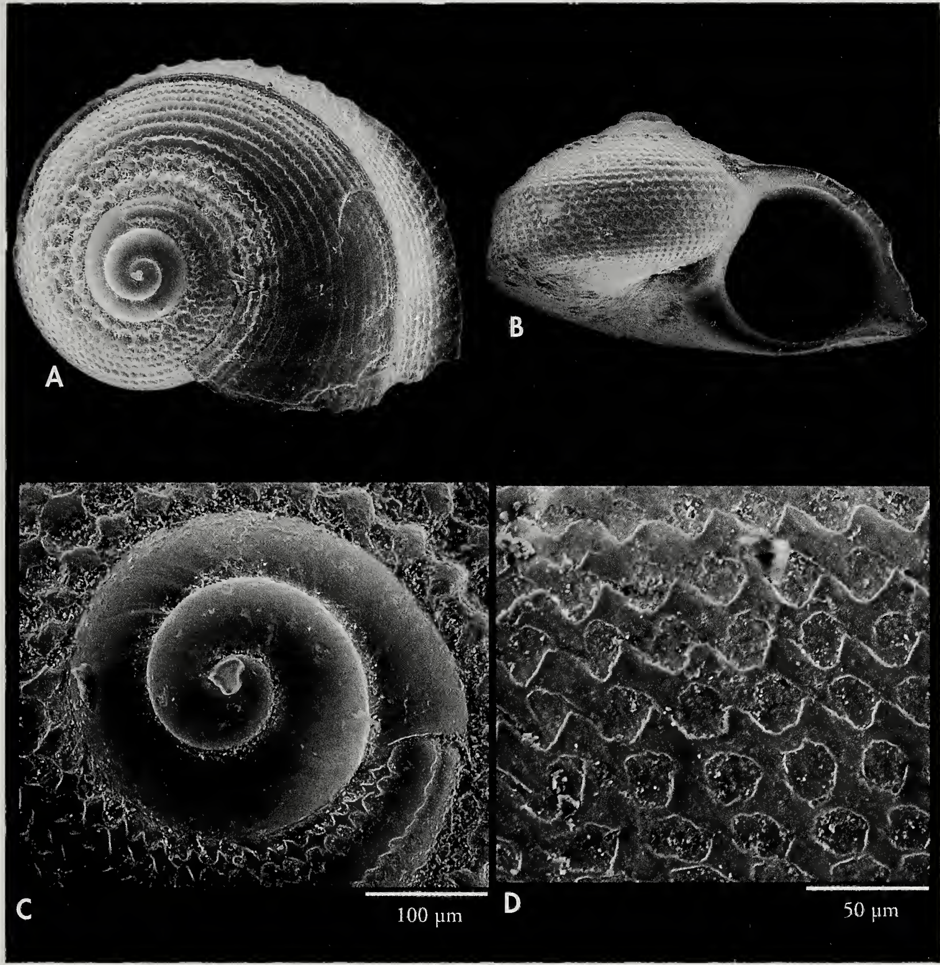


Figure 53A-D. *Anticlimax imitatrix* spec. nov. A-B: holotype, 1.3 mm (MNHN); C: protoconch (holotype); D: microsculpture. Solomon Islands, Stn. CP1858, 435-461 m.
Figura 53A-D. Anticlimax imitatrix *spec. nov. A-B: holotipo, 1,3 mm (MNHN); C: protoconcha (holotipo); D: microescultura. Islas Salomón, Stn. CP1858, 435-461 m.*

dimensions of the protoconch; the wide spiral cords that become nodulose on the adapical part of the ½ last whorl; the presence of small axial folds that disappear, keeling the basal carina; the triangular shape of the outer lip, its angle and the lateral extension, the thickening and reflection of the columella.

In its general appearance it is very similar to *A. solomomensis* spec. nov., but may be separated by the presence on the external lip of a single angle instead of two; by a smaller number and different size of the axial folds on the last whorl; by the greater number of spiral cords on the adapical part and by these being almost smooth.

From *A. maestratii* spec. nov. it is distinguished by the smaller size of the protoconch and the lack of spiral grooves. From *A. philippinensis* and *A. uniformis* spec. nov. by the teleoconch being bicarinate and the smaller size of the protoconch.

Table V. Differences between species of group 5.
Tabla V. Diferencias entre especies del grupo 5.

species	Protococonch µm	Protococonch whorls	Periferical keel	prominence	umbilicus
A. tentorii	300	1 and a little	basal	basal	medium
A. discus	200	1 1/2	widebasal	negligible	covered by callus
A. lentiformis	330	2 1/4	at the middle	scarcely prominent	minimum
A. globulus	440	2 1/2	narrow, basal	2 at the end	small

Group 5

Description: The species of this group, in spite of their different shapes, can be grouped together by: being dome-shaped; having a teleoconch with a prominent basal carina which angles and expands the external lip.

It is made up of 4 species: *A. tentorii*, *A. discus*, *A. lentiformis* and *A. globulus*. Their differences are shown in Table V.

Anticlimax tentorii spec. nov. (Figures 7E, 54A-E)

Type material: Holotype in MNHN 27209 (Figs. 7E, 54A) and 1 paratype (MNHN 27210) (Fig. 54B).
Material examined: (2 s): Only from the type locality.
Type locality: Vanuatu, SW coast of Aoré Island, Segond Channel, 15°35.1'S, 167°07.6'E, 36 m, coarse sand rubble [SANTO 2006: Stn. ZS25].
Etymology: The specific name derives from the Latin word *tentorium, -ii,* which means "tent" alluding to the shape of the shell.

Distribution: Only known from Aoré Island, Vanuatu, its type locality at 36 m.

Description: Shell of medium size for the genus (<4.5 mm), very solid, strongly convex, dome-shaped, with a marked basal keel; consisting of 4 whorls of rapid growth. Protoconch with a little more than one whorl, measuring about 300 μm and being seemingly smooth, although this could not be verified due to abrasion of the specimen. Teleoconch with 3 whorls; a thin callous sutural coating extends from the suture and partially covers the previous whorl and a strong keel delimits the base. The ornamentation is formed by spiral cords wider than their interspaces, which zigzag and cover the whole shell. Aperture triangular; very thick parietal callus; columella slightly arched, very thick and reflected towards the umbilicus; outer lip smooth at its margin, not modified except for the contact area with the basal keel that widens and expands it laterally. Umbilicus not very wide or deep, concealing the earlier whorls, not limited by any carina and with only some axial growth lines inside.

Dimensions: the holotype is 4.2 mm in diameter.

Habitat: Infralittoral species collected in coarse sand and rubble bottom at 36 m in depth.

Remarks: The most significant characteristics of the present species are: its large size in comparison to other species of the genus; the convex form (dome-shaped); the prominent keel which amplifies the periphery; the thick columellar callus which closes the umbilicus and the angled shape of the outer lip. With these characteristics this species is different from all others known within the genus.

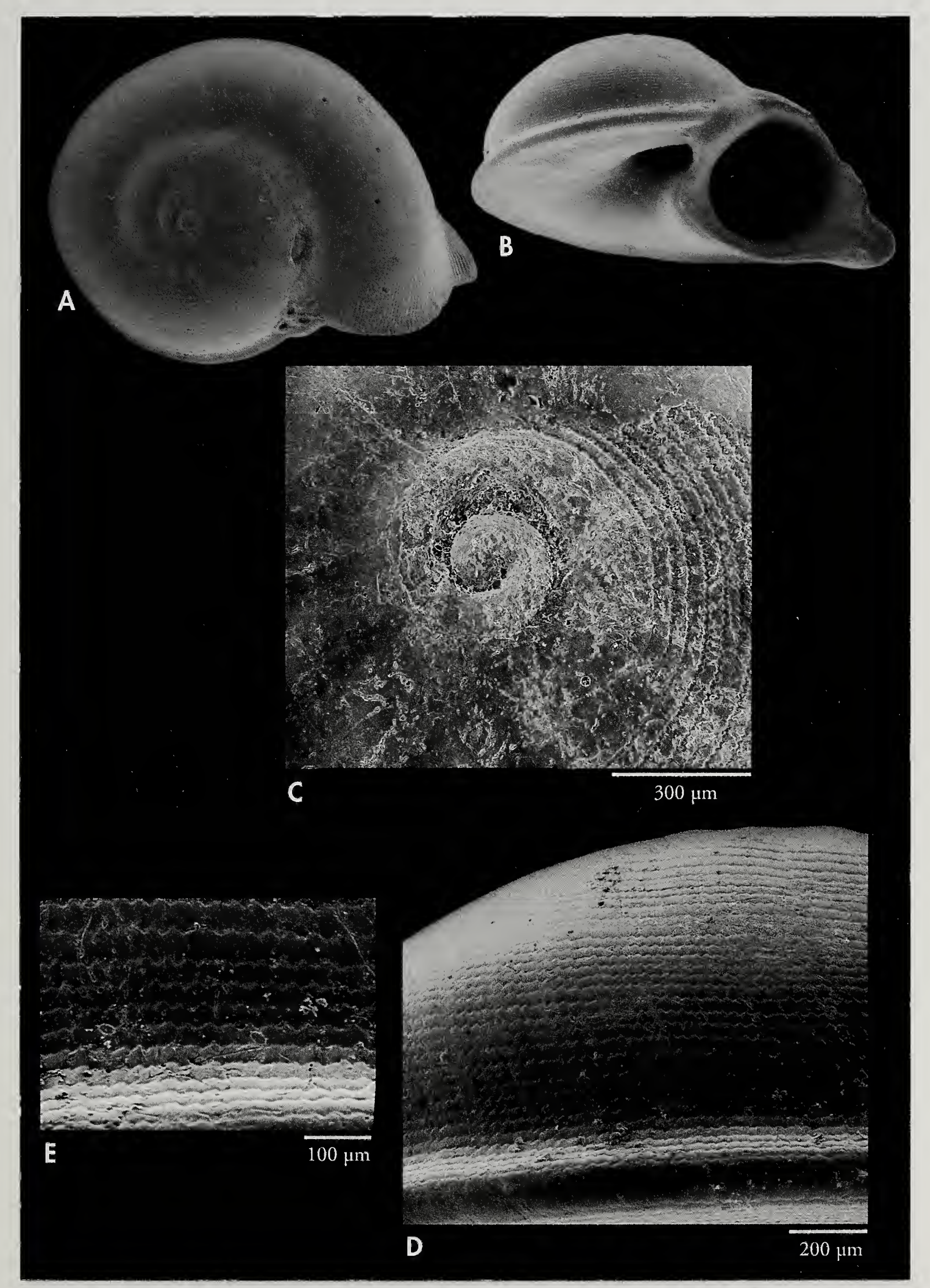


Figure 54A-E. *Anticlimax tentorii* spec. nov. A: holotype, 4.2 mm (MNHN); B: paratype, 4.05 mm (MNHN); C: protoconch (holotype); D-E: microsculpture and detail. Vanuatu, Segond Channel, SW coast of Aoré Island, Stn. ZS25, 36 m.

Figura 54A-E. Anticlimax tentorii *spec. nov. A: holotipo, 4,2 mm (MNHN); B: paratipo, 4,05 mm (MNHN); C: protoconcha (holotipo); D-E: microescultura y detalle. Vanuatu, Canal Segond, costa SO de la isla Aoré, Stn. ZS25, 36 m.*

Anticlimax discus spec. nov. (Figures 7F, 55A-F, 56A-E)

Type material: Holotype MNHN 27211 (Figs. 7F, 55A-B).
Material examined: (2 s): Philippines, PANGLAO 2004: 1 s, Bohol Island, Cortes, Stn. T18, 9°41.2'N, 123°49.9'E, 80-100 m, muddy bottom with sponges (type material). Vanuatu: 1 s, MUSORSTOM 8: Stn. DW1101, 15°03'S, 167°08'E, 205-210 m (Fig. 56).
Type locality: Philippines, Bohol Island, Cortes, 9°41.8'N, 123°49.9'E, 80-100 m [PANGLAO 2004: Stn. T18].
Etymology: The specific name alludes to the discoidal shape of the shell of this species.

Distribution: Only known from the Philippines between 80 and 100 m and from Vanuatu, between 205 and 210 m.

Description: Shell small (<2.5 mm), very solid, dome-shaped, not umbilicate.

The species has the particularity that the protoconch is almost completely covered by the following whorls of the spire, making it very difficult to specify size, number of whorls or ornamentation; however, from what we have been able to see with SEM, the protoconch should have a minimum dimension of about 220 μm, over 1 ½ whorls and a slightly rough surface of the embryonic stage.

The teleoconch has 2 whorls and a thick basal carina. Each whorl covers the previous one almost completely and its entire surface shows zigzagging spiral cords and grooves in the interspaces, including the surface of the carina. On the adapical part and for the last half whorl, there are 26-28 spiral cords all them reaching the adapical margin of the outer lip. On the basal carina 4-7 spiral cords can be seen. The base is convex and is raised in the central part surrounding the umbilical area; there are 20 spiral cords, of which 12 are distributed between the basal carina and the elevation and 8, wider ones, from the elevation to the umbilical callus.

Aperture triangular, prosocline; a thick parietal callus develops on the base of the shell; columella arched, very thick and reflected towards the umbilicus, forming a large columellar callus which occludes it completely; both parietal and columellar callus are covered by spiral cords in zigzag, like the rest of the shell. Outer lip with a smooth margin, expanded laterally by the effect of the basal carina, which angles it internally. Umbilicus completely covered by the expansion of the columellar callus.

Dimensions: the holotype is 1.78 mm in diameter. A shell from Vanuatu reaches 2.37 mm.

Habitat: Circalittoral species trawled at 80-100 m on muddy bottom with sponges from Philippines, Panglao 2004, Stn. T18. Bathyal species dredged at 205-210 m from Vanuatu, MUSORSTOM 8, Stn. DW1101.

Remarks: The species is characterized by its shape (dome-shaped), its ornamentation formed by cordlets and zigzagging spiral grooves which cover all the shell, including the parietal and columellar calluses; the wide basal carina, the thick columellar callus and the basal elevation that limits the umbilical area.

Although initially we believed that due to the different bathymetry and long distance the materials collected in the Philippines and Vanuatu were different species, once all morphological characters were verified, we have concluded that they are both the same species.

Anticlimax lentiformis spec. nov. (Figures 7G, 57A-E, 58A-E)

Type material: Holotype MNHN 27212 (Figs. 7G, 57A-C).
Material examined: (3 s): Fiji: 1 s, MUSORSTOM 10: DW1345, 17°15'S, 178°30'E, 660-663 m (type material). Philippines: 2 s, Bohol Island, Cortes, PANGLAO 2004: Stn. T18, 9°41.2'N, 123°49.9'E, 80-100 m, muddy bottom with sponges (Fig. 58).

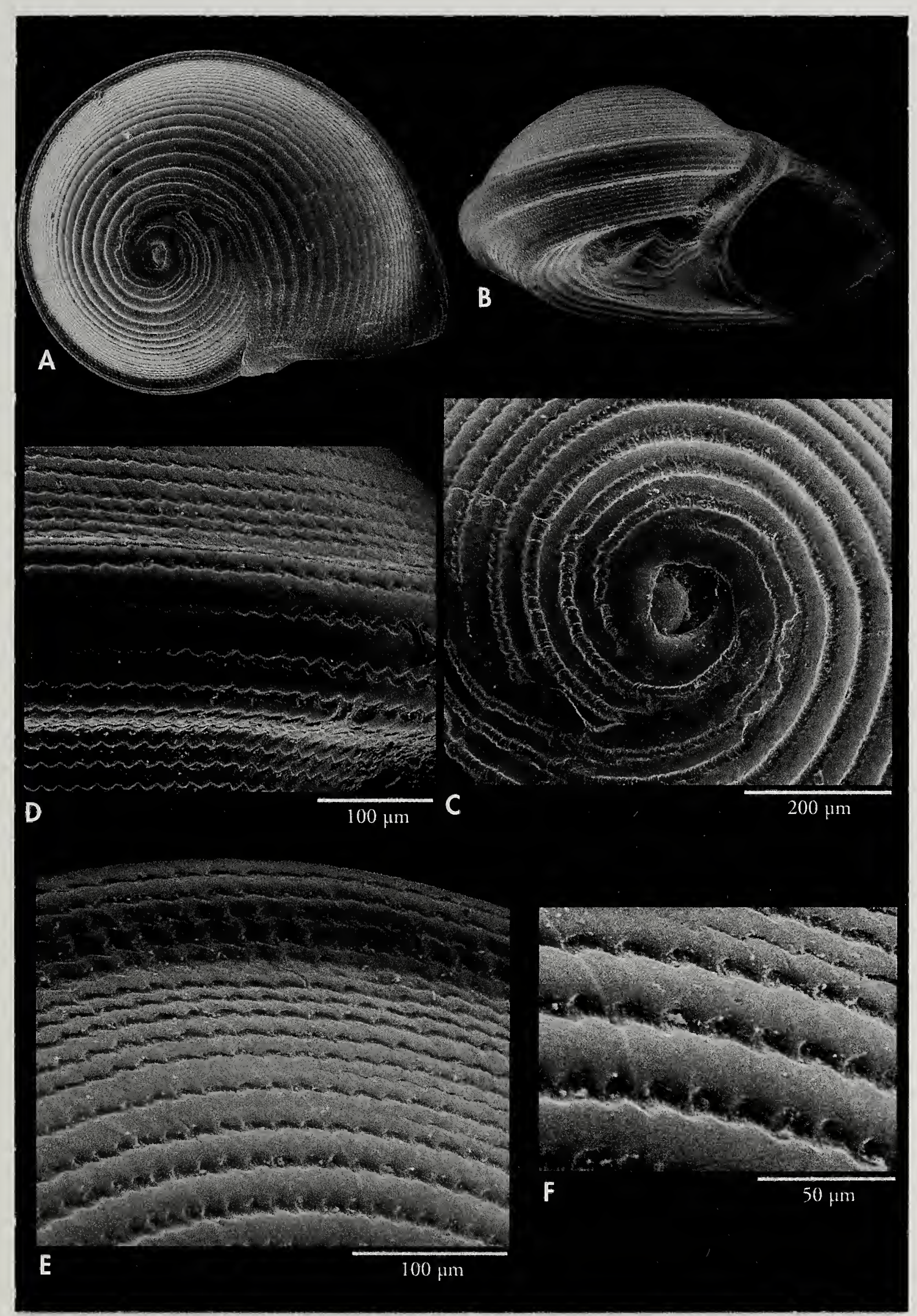


Figure 55A-F. *Anticlimax discus* spec. nov. A-B: holotype, 1.78 mm (MNHN); C: protoconch of the holotype; D-F: microsculpture and detail. Philippines, Bohol Island, Cortes, Stn. T18, 80-100 m.

Figura 55A-F. Anticlimax discus *spec. nov. A-B: holotipo, 1,78 mm (MNHN); C: protoconcha del holotipo; D-F: microescultura y detalle. Filipinas, Isla de Bohol, Cortes, Stn. T18, 80-100 m.*

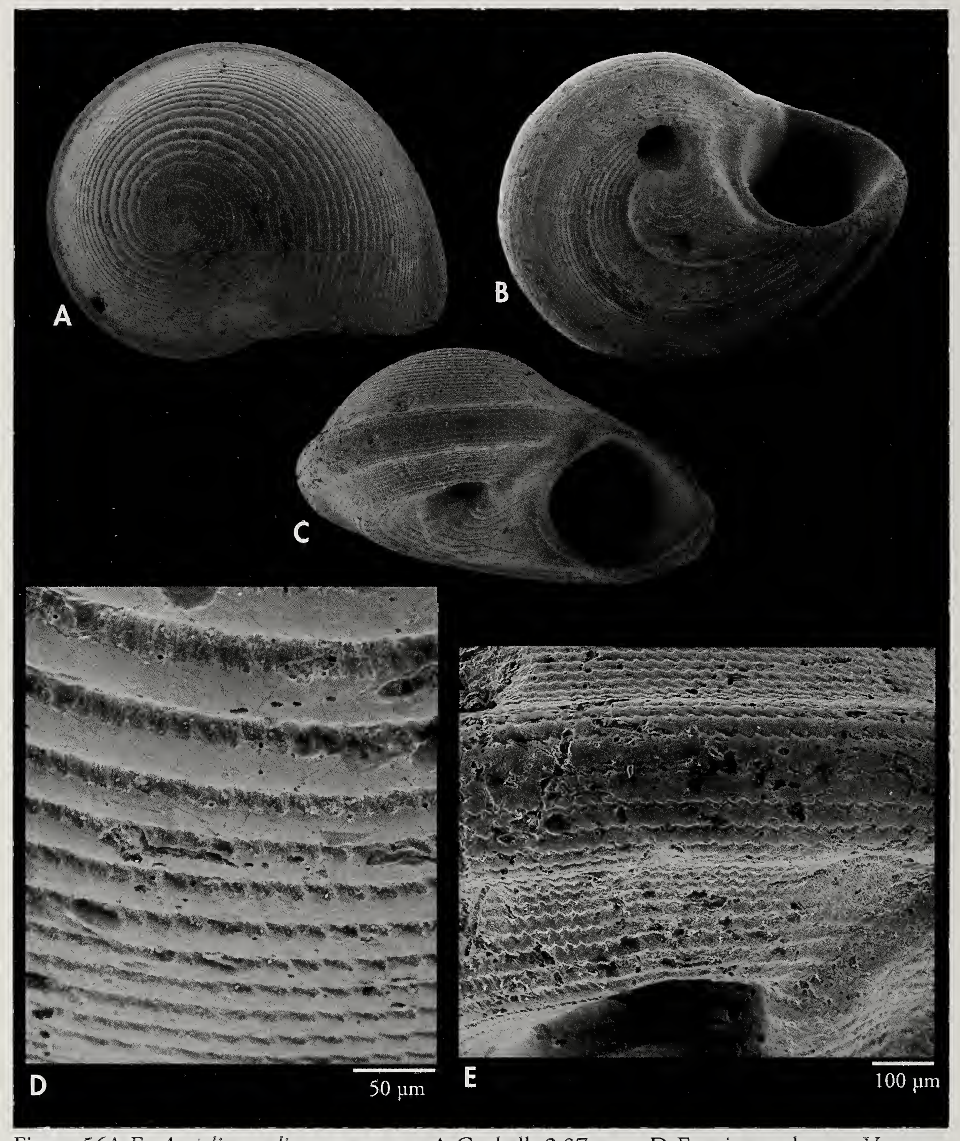


Figure 56A-E. *Anticlimax discus* spec. nov. A-C: shell, 2.37 mm; D-E: microsculpture. Vanuatu, MUSORSTOM 8, Stn. DW1101, 205-210 m.
Figura 56A-E. Anticlimax discus *spec. nov. A-C: concha, 2,37 mm; D-E: microescultura. Vanuatu, MUSORSTOM 8, Stn. DW1101, 205-210 m.*

Type locality: Fiji, 17°15'S, 178°30'E, 660-663 m [MUSORSTOM 10: Stn. DW1345].
Etymology: The specific name derives from the Latin word *lens, -tis,* "lentis" alluding to the shape of the shell.

Distribution: Only known from Fiji, between 660 and 663, and the Philippines between 80 and 100 m.

Description: Shell very small (<1.5 mm), discoid, robust, strongly carinate, wider than high and umbilicate. The

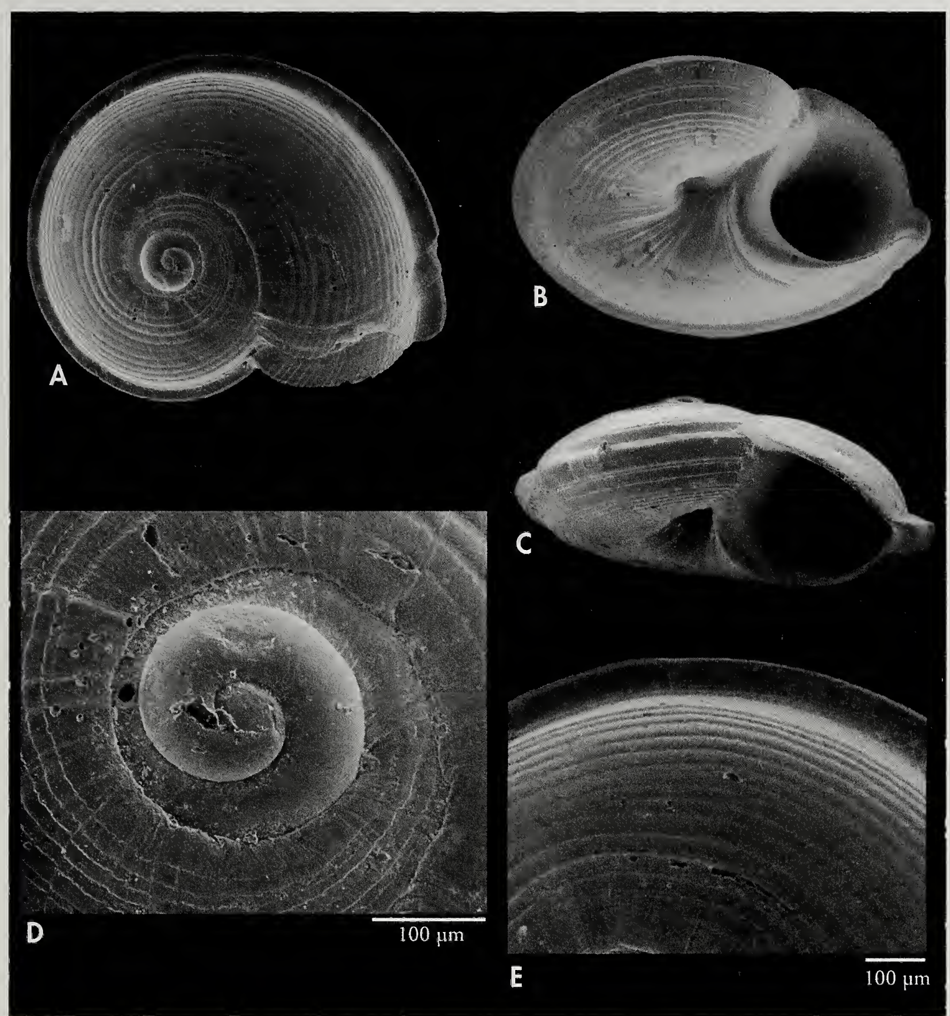


Figure 57A-E. *Anticlimax lentiformis* spec. nov. A-C: holotype, 1.46 mm (MNHN); D: protoconch of the holotype; E: detail of the sculpture. Fiji, MUSORSTOM 10, DW1345, 660-663 m.
Figura 57A-E. Anticlimax lentiformis *spec. nov. A-C: holotipo, 1,46 mm (MNHN); D: protoconcha del holotipo; E: detalle de la escultura. Fiyi, MUSORSTOM 10, DW1345, 660-663 m.*

protoconch has 2 ¼ whorls, measures about 330 μm, and may vary in regard to the portion covered by the first teleoconch whorl. It has two distinct phases; the first is completely smooth and the second is covered by growth lines, more evident along the suture; the first whorl of the teleoconch partially covers the protoconch. The teleoconch has about 1 ½ whorls; a thick peripheral carina surrounds it; each whorl partially covers the previous one. Adapical area and base are convex. Ornamentation formed by flat spiral cords, of different sizes, separated by marked spiral grooves; in the vicinity of the outer lip and from the suture to the peripheral carina there are up to 26-28 smooth cords.

Base with 8 flat spiral cords of different size and grooves in the interspaces, close to the peripheral carina; there are fine axial folds that extend from halfway

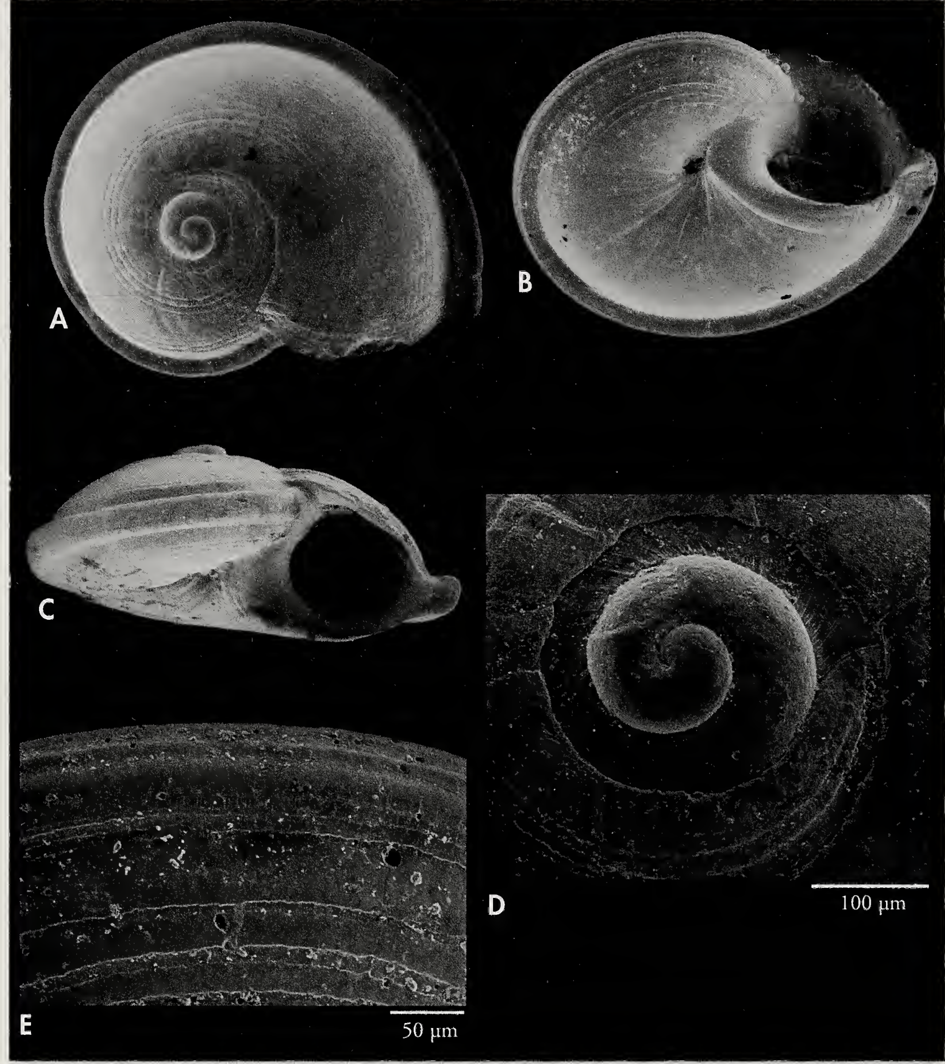


Figure 58A-E. *Anticlimax lentiformis* spec. nov. A-C: shell, 1.3 mm; D: protoconch; E: detail of the sculpture. Philippines, Bohol Island, Cortes, Stn. T18, 80-100 m, in muddy bottom with sponges.
Figura 58A-E. Anticlimax lentiformis *spec. nov. A-C: concha, 1,3 mm; D: protoconcha; E: detalle de la escultura. Filipinas, Isla de Bohol, Cortes, Stn. T18, 80-100 m, en fondo fangoso con esponjas.*

along the base to the umbilicus and marked growth lines that penetrate inside.

Aperture triangular, prosocline; parietal area covered by a thick callous coating; columella arched, very thick and reflected towards the umbilicus, forming a callus which tends to occlude it; adapical part of the outer lip crenulated externally by the termination of the spiral cords and centrally notched by the peripheral carina, which expands it laterally. Height and width of the umbilicus allow the previous whorls to be seen. It is progressively occluded by the thickening and reflection of the columella, which does not form a thick spiral cord.

Dimensions: the holotype measures 1.46 mm in maximum diameter.

Habitat: In Fiji, it is a bathyal species, dredged between 660-663 m deep; in the Philippines, it is a circalittoral species, trawled between 80-100 m on a muddy bottom with sponges.

Remarks: The profile of *Anticlimax lentiformis* spec. nov. is similar to the species of its group.

Anticlimax lentiformis spec. nov. is characterized by its discoid shape; also by the first whorl of the teleoconch covering partially the protoconch, its thick peripheral carina, its triangular aperture and the thickness of the columellar callus reflected towards the umbilicus.

The differences are: *A. tentorii* spec. nov. is higher, has a wider umbilicus and a more prominent end of the spire as a continuation of the keel. *A. discus* spec. nov. has an umbilicus totally closed by a callus expanded from the columella.

Anticlimax globulus spec. nov. (Figures 7H, 59A-F)

Type material: Holotype MNHN 27231 (Figs. 7H, 59A-C).

Material examined: Only the type material.

Type locality: Papua New Guinea, Hargun I., 5°01.6'S, 145°48.1'E, 16 m [PAPUA NIUGINI: Stn. PS18].

Etymology: The specific name alludes to the similarity of this species with the morphology of a knob or button.

Distribution: Only known from Papua New Guinea, at 16 m.

Description: Shell small (<3 mm), composed of 4 rapidly increasing whorls, dome-shaped, basally carinate; with a low spire and narrowly umbilicate.

The protoconch is placed higher than the teleoconch, measures about 430 μm, has more than 2 ¼ whorls, is completely smooth and shows several phases of development. The teleoconch has 1 ½ whorls, a prominent basal carina and is fully decorated with cords and spiral grooves and marked growth lines. At the beginning of the teleoconch, there are 4 cords, wider than their interspaces, on the adapical part and 8-9 more cords between the suture and the basal carina, which become thicker on approaching the lip and modify its margin.

In the first half spiral whorl, the spaces between the cords are occupied by quadrangular cells which subsequently disappear, giving way to more or less wide grooves with numerous axial striae inside. There is no peripheral carina; between the adapical part and the basal carina there is a space occupied by flat spiral cords. Base slightly convex on which there are 10 thick spiral cords, distributed between the basal carina and the umbilicus; 2 smaller cords penetrate into the umbilicus; the spaces between the cords are occupied by grooves inside which there are numerous growth lines. Aperture triangular; parietal area covered by a thick callus; thick columella, arched and reflected towards the umbilicus, but without occluding it; adapical part of outer lip crenulated externally by the termination of the spiral cords, forming a scalloped margin, basal carina forming a narrow angle which prolongs the lip laterally. Umbilicus narrow and deep not limited by a cord or keel, with two cords that penetrate inside.

Dimensions: the holotype is 2.67 mm in diameter.

Habitat: Infralittoral species dredged at 16 m in depth.

Remarks: *A. globulus* spec. nov. is characterized by the large size of its protoconch; by its domed shape; by the wide cords on the adapical part which, when they reach the lip, raise and modify it forming a scalloped margin; by the prominent basal carina which angles the outer lip and prolongs it laterally and by its narrow and deep navel.

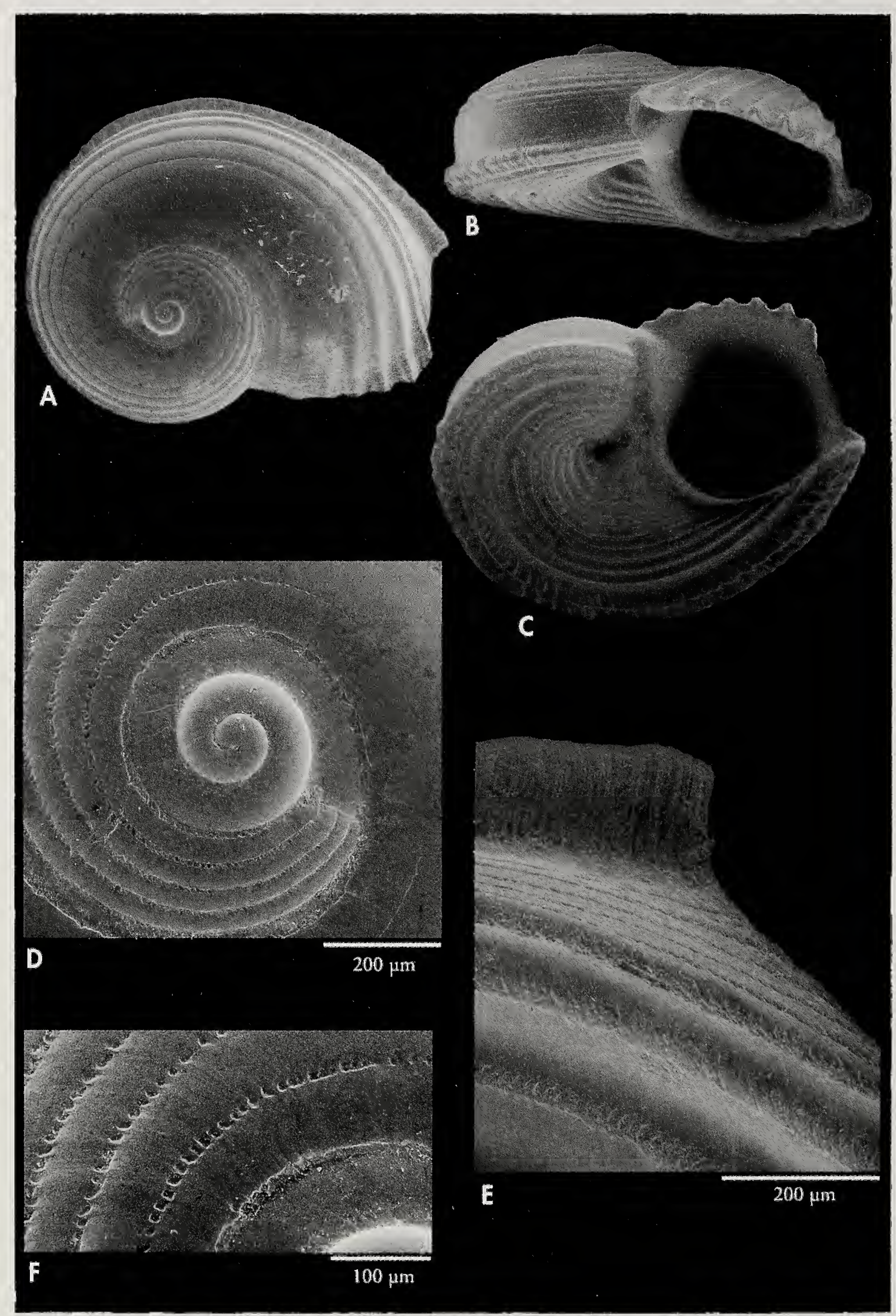


Figure 59A-F. *Anticlimax globulus* spec. nov. A-C: holotype, 2.67 mm (MNHN); D: protoconch (holotype); E-F: microsculpture, Hargun I., Papua New Guinea, Stn. PS18, 16 m.
Figura 59A-F. Anticlimax globulus *spec. nov. A-C: holotipo, 2,67 mm (MNHN); D: protoconcha (holotipo); E-F: microescultura, isla de Hargun, Papua Nueva Guinea, Stn. PS18, 16 m.*

Table VI. Differences between species of group 6.
Tabla VI. Diferencias entre especies del grupo 6.

	Diameter protoconch in µm	N° whorls	Sculpture second phase	Prominent sutural cord
A. boucheti	350	2 1/4	axial ribs	no
A. philsmithi	510	2 1/2	smooth	no
A. simplicissimus	200	1 1/4	covered by the following whorl	yes
A. virginiae	420	2 1/4	smooth	no

GROUP 6

This group is formed by species which have no very typical shape or much similarity but they are discoid, depressed, finely microsculptured and lack evident prominences or protuberant carinae.

There are 4 species: *Anticlimax boucheti, A virginiae, A. obesa* and *A. juanae* spec. nov.

Table VI illustrates the differences between species.

Anticlimax boucheti spec. nov. (Figures 7I, 60A-G, 61A-F)

Type material: Holotype MNHN 27213 (Figs. 7I, 60A-C). Paratype MNHN 27214, s (Fig. 61A-C) from West-Southwest of the Pointe d'Easo, Baie du Santal, New Caledonia, Stn. 1430, 20-25 m.
Material examined: (2 s): New Caledonia, MONTROUZIER: 1 s, Stn. 1331, Grand Récif de Koumac, Koumac area, 20°40'S-20°40.6'S, 164°11.2'E-164°12.1'E, 55-57 m, outer slope (holotype); LIFOU 2000: Stn. 1430, West-Southwest of Pointe d'Easo, Baie du Santal, 20°47.5'S, 167°07.1'E, 20-25 m (paratype).
Type locality: New Caledonia, Grand Récif de Koumac, Koumac area, 20°40'S-20°40.6'S, 164°11.2'E-164°12.1'E, 55-57 m, [MONTROUZIER: Stn. 1331].
Etymology: The specific name is after Dr. Philippe Bouchet of the MNHN the driving force behind the exploration campaigns of the Tropical South Pacific.

Distribution: Only known from New Caledonia between 25 and 55 m.

Description: Shell small (<2 mm), formed by less than 4 rapidly increasing whorls, with a very low spire.

Protoconch protruding, large in relation to the size of the shell, measuring about 350 µm in diameter, and having almost 2 ¼ whorls; the nucleus is smooth and the first whorl has a smooth surface with granules of different shape and size, randomly distributed; on the following whorl marked sinuous axial ribs appear.

Teleoconch with 1 ½ whorls developed on the same plane. There are 3 carinae which angle the shell: 2 peripheral and one lower. Of the two peripheral carinae, the adapical one fades and disappears in the last ½ whorl, while the lower one limits the base and modifies the outer lip. The basal carina separates two areas: one concave, bordering the peripheral carina and another, convex, which surrounds the umbilicus. Ornamentation formed by spiral cords and axial ribs, the latter undulating at the periphery. At the crossing point with the cords, the ribs form a characteristic type of cell reticle and also a small tubercle at the point of intersection.

Aperture rounded; parietal area covered by a thin callous coating; columella arched, externally reflected, with a thin edge modified by the spiral cords of the umbilicus; outer lip with a sharp margin modified by the spiral cords, forming a characteristic angle caused by the peripheral basal carina and its own basal one.

Very wide umbilicus, that allows the previous whorls to be seen, delimited by a basal carina, and bearing larger cells than the reticule of the shell.

Dimensions: the holotype measures 1.6 mm in diameter.

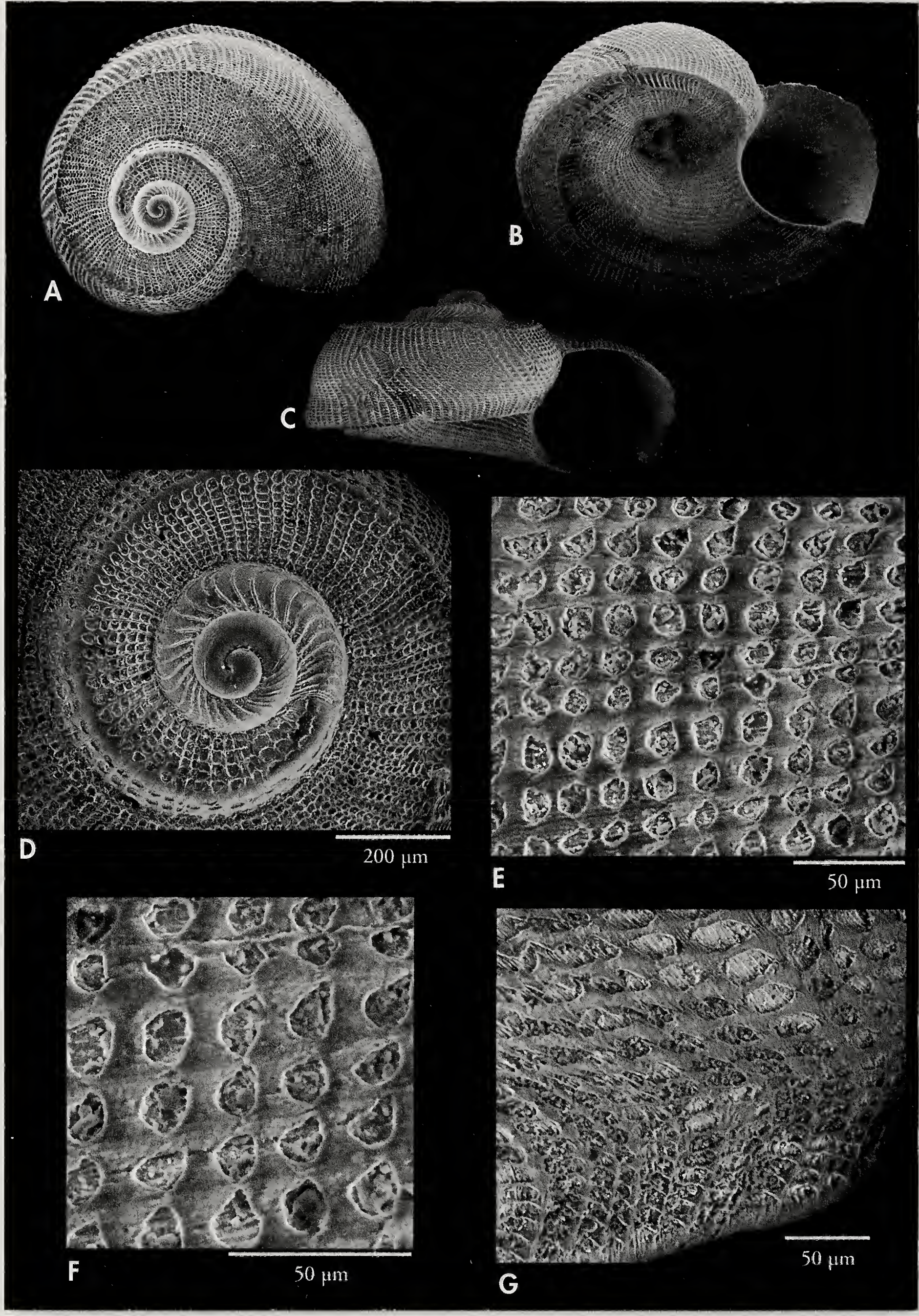


Figure 60A-G. *Anticlimax boucheti* spec. nov. A-C: holotype, 1.6 mm (MNHN); D: apical view and protoconch (holotype); E-G: microsculpture and detail of the teleoconch. New Caledonia, Koumac area, Grand Récif de Koumac, Stn. 1331, 55-57 m.

Figura 60A-G. Anticlimax boucheti *spec. nov. A-C: holotipo, 1,6 mm (MNHN); D: vista apical y protoconcha (holotipo); E-G: microescultura y detalle de la teleoconcha. Nueva Caledonia, alrededores de Koumac, Grand Récif de Koumac, Stn. 1331, 55-57 m.*

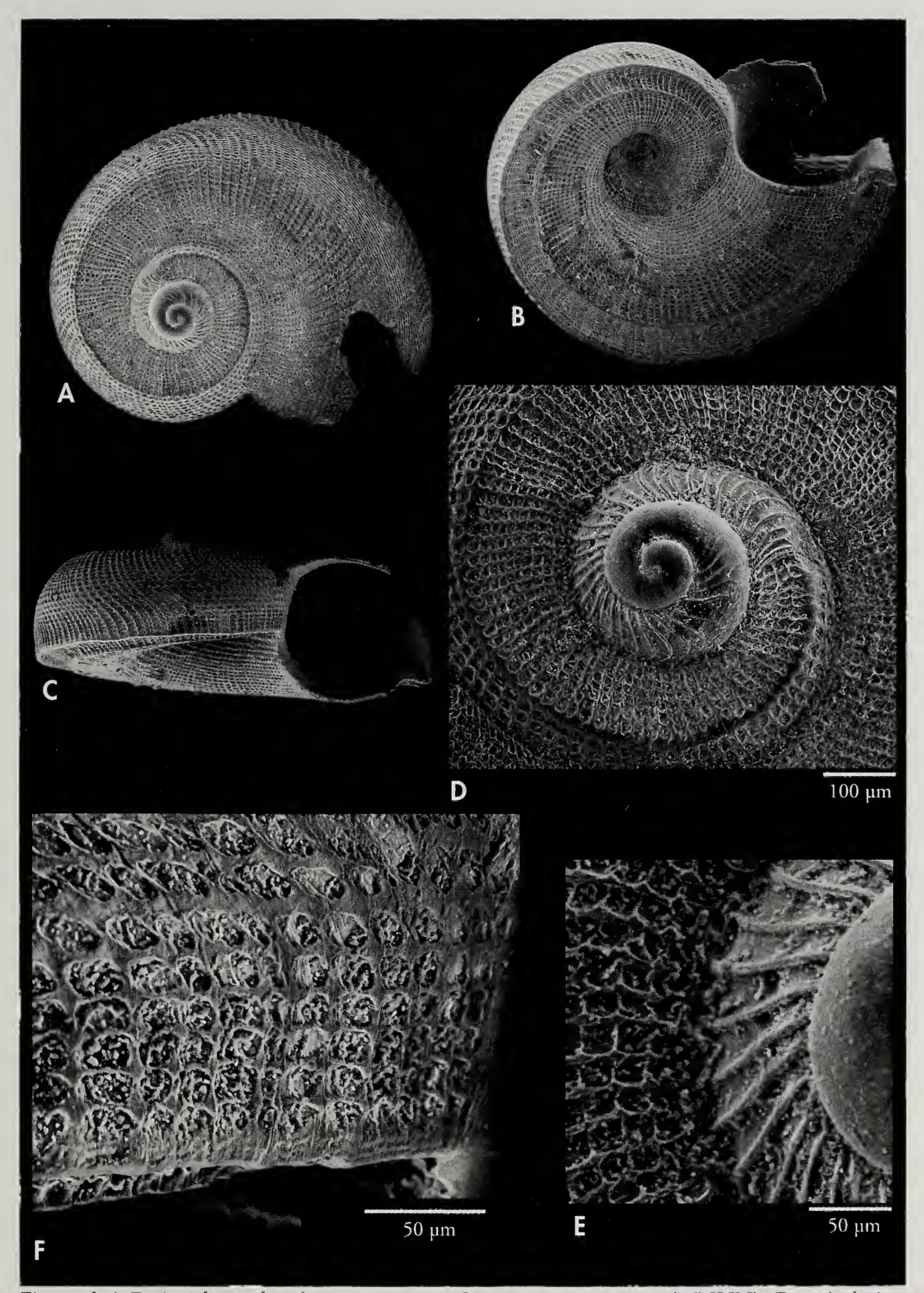


Figure 61A-F. *Anticlimax boucheti* spec. nov. A-C: paratype, 1.39 mm (MNHN); D: apical view and protoconch; E: microsculpture of the protoconch; F: microsculpture of the teleoconch. New Caledonia, Loyalty Is., Santal Bay, West-Southwest of Easo Point, Stn. 1430, 20-25 m.

Figura 61A-F. Anticlimax boucheti *spec. nov. A-C: paratipo, 1,39 mm (MNHN); D: vista apical y protoconcha; E: microescultura de la protoconcha; F: microescultura de la teleoconcha. Nueva Caledonia, Isla de Loyauté, Bahía de Santal, Oeste-Suroeste de Punta Easo, Stn. 1430, 20-25 m.*

Habitat: Circalittoral species, living on the external slope of the reef.

Remarks: The clearest characteristics of *Anticlimax boucheti* spec. nov. is the large size (350 μm) of its protoconch ornamented with granules on the first whorl and followed by undulating axial ribs; its teleoconch with three peripheral carinae, which is decorated with spiral cords and axial ribs, undulating along the periphery, and its wide umbilicus.

Anticlimax philsmithi spec. nov. (Figures 8A, 62A-F, 63A-F)

Type material: Holotype MNHN 27232 (Figs. 8A, 62A-F) and 5 paratypes MNHN 27233.
Material examined: (12 s): Papua New Guinea, PAPUA NIUGINI: 6 s, N Kabanam Point, Stn. PS17, 5°06.0'S, 145°48.2'E (type material), 2 m; 5 s, N Riwo, Stn. PS46, 5°08.7'S, 145°48.2'E, 2 m, mangrove and seagrass. Philippines, PANGLAO 2004: 1 s, Panglao Island, Pontod Islet, Stn. D5, 9°33.6'N, 123°43.5'E, 0-3 m, soft bottom with seagrass.
Type locality: Papua New Guinea, Kabanam Point, 5°06.0'S, 145°48.2'E, 2 m [PAPUA NIUGINI: Stn. PS17].
Etymology: This species is named after Father Phil Smith, Vice-President of the Divine Word University, Madang, which hosted the Papua Niuguini 2012 expedition.

Distribution: Papua New Guinea at 2 m and the Philippines between 0 and 3 m.

Description: Shell solid in appearance, formed by 3 ¾ fast-growing whorls, basally carinate; with a nearly flat spire and with a narrow umbilicus.

The protoconch has 2 ½ whorls, measuring about 510 μm in diameter and although seemingly smooth, very fine tubercles may be seen close to the suture under high magnification; it is possible to see up to 3 phases in its development. The teleoconch has just 1 ¼ whorls and is entirely decorated with spiral cords of similar size, narrower than their interspaces, between which there are rectangular cells. A marked carina limits the base, and there is no other peripheral keel. The adapical part is convex and the base is flat.

Between the suture and the basal carina, there are 18 spiral cords; between the basal carina and the umbilicus there are 11-12. On the base, the space between the first and second spiral cord is a broad groove, larger than the others, occupied by fine axial striae instead of the cells. Umbilicus narrow and deep, not limited by any carina or occluded by a callus. Aperture rounded, prosocline; parietal area callous covered by a thick layer; columella curved, slightly reflected towards the umbilicus; outer lip with a smooth margin; basal carina angles it internally.

Dimensions: the holotype measures 1.5 mm in diameter. The largest shell studied measures 1.80 mm.

Habitat: Infralittoral species collected at -2 m in mangrove and seagrass bottom (Stn. PS46 in Papua New Guinea); 0-3 m, soft bottom with seagrass (Stn. D5 in Philippines). Bathymetric range between 0-3 m in depth.

Remarks: *Anticlimax philsmithi* spec. nov. is characterized by its wide protoconch in relation to the total diameter of the shell; by its basal carina and striae that occupy the spaces between the cords; by its narrow umbilicus and aperture slightly angled by a basal carina. A single specimen from the Philippines has been studied and despite the general resemblance, its protoconch has a diameter of 450 μm, significantly less than the studied samples from Papua New Guinea.

Anticlimax simplicissima spec. nov. (Figures 8B, 64A-F)

Type material: Holotype MNHN 27234 (Figs. 8B, 64A-F).
Material examined: Only the type material.
Type locality: Papua New Guinea, Alexishafen, 5°05.3'S, 145°48.1'E, 1-6 m [PAPUA NIUGINI: Stn. PD31].
Etymology: The specific name alludes to its shape that lacks prominences and has a spiral simple sculpture.

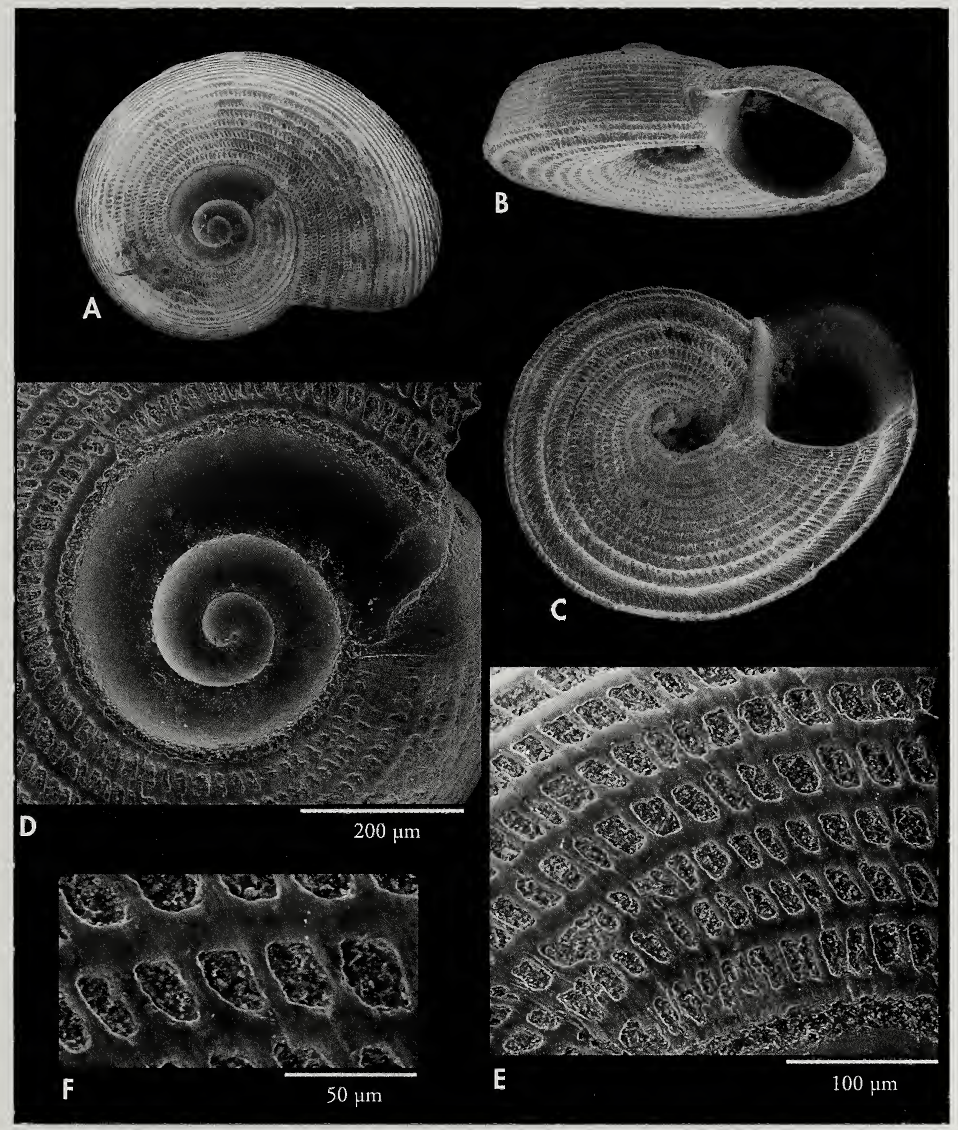


Figure 62A-F. *Anticlimax philsmithi* spec. nov. A: holotype, 1.5 mm (MNHN); B: paratype, 1.67 mm (MNHN); C: paratype, 1.7 mm (MNHN); D: protoconch (paratype); E-F: microsculpture. N Kabanam Point, Papua New Guinea, Stn. PS17, 2 m.

Figura 62A-F. Anticlimax philsmithi *spec. nov. A: holotipo, 1,5 mm (MNHN); B: paratipo, 1,67 mm (MNHN); C: paratipo, 1,7 mm (MNHN); D: protoconcha (paratipo); E-F: microescultura. N de Punta Kabanam, Papua Nueva Guinea, Stn. PS17, 2 m.*

Distribution: Only known from its type locality between 1 and 6 m.

Description: Shell small, sturdy, with a rounded periphery, formed by 3 ¼ whorls, umbilicate.

The protoconch is deeply sunken, has 1 ¼ whorls, measures 200 µm, is smooth and shows 2 phases in its development. The teleoconch has about 2 whorls. The ornamentation is formed by

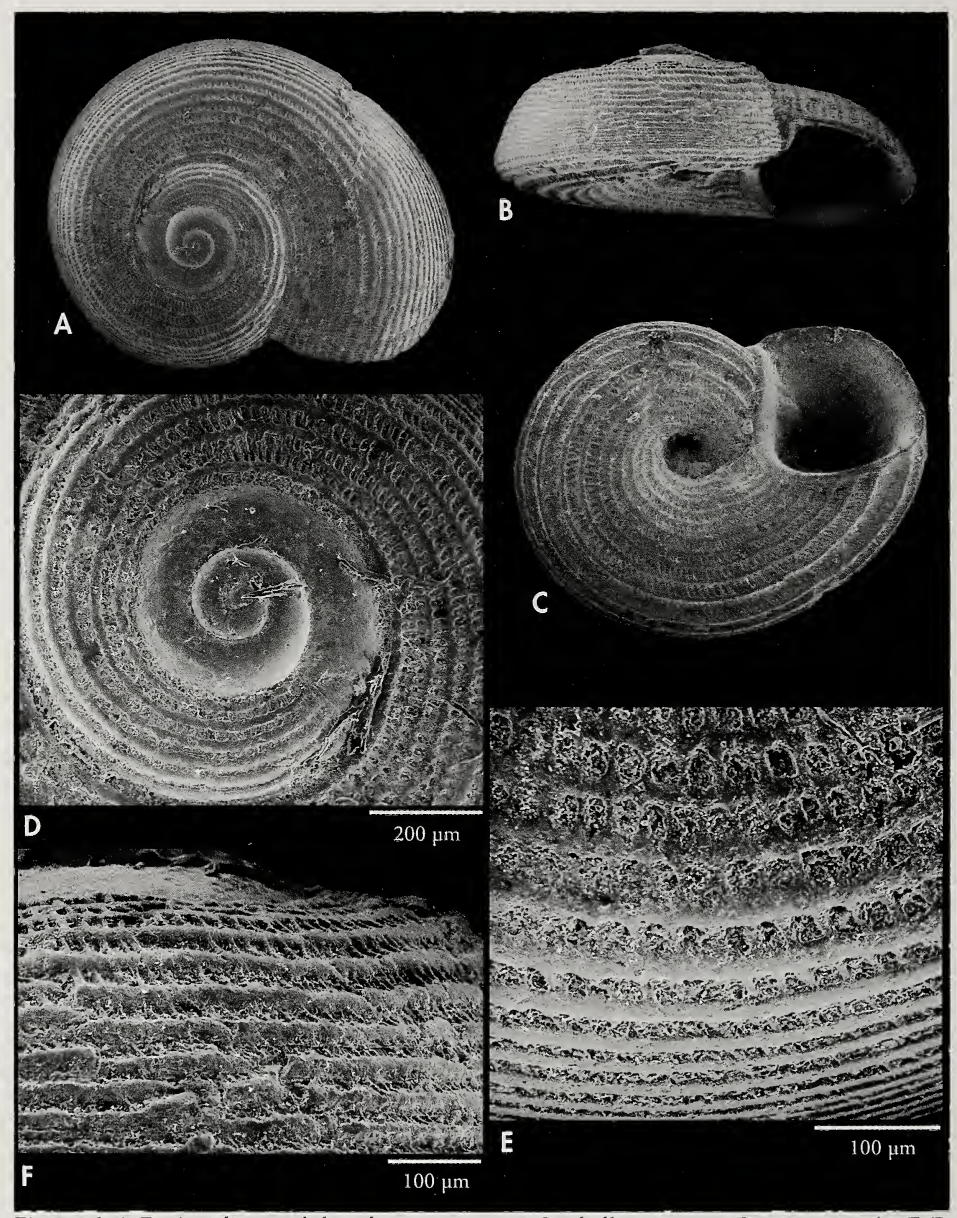


Figure 63A-F. *Anticlimax philsmithi* spec. nov. A-C: shell, 1.8 mm; D: protoconch; E-F: microsculpture. Philippines, Panglao Island, Pontod Islet, 0-3 m.
Figura 63A-F. Anticlimax philsmithi *spec. nov. A-C: concha, 1,8 mm; D: protoconcha; E-F: microescultura. Filipinas, Isla de Panglao, Islote de Pontod, 0-3 m.*

cords and spiral grooves, covering all the shell. The subsutural cord is smooth and very thick; a thick cord decorated with axial striae borders the umbilicus; between the subsutural and the periumbilical cords, zigzagging spiral grooves are distributed. Two not very pronounced carinae are observed at the

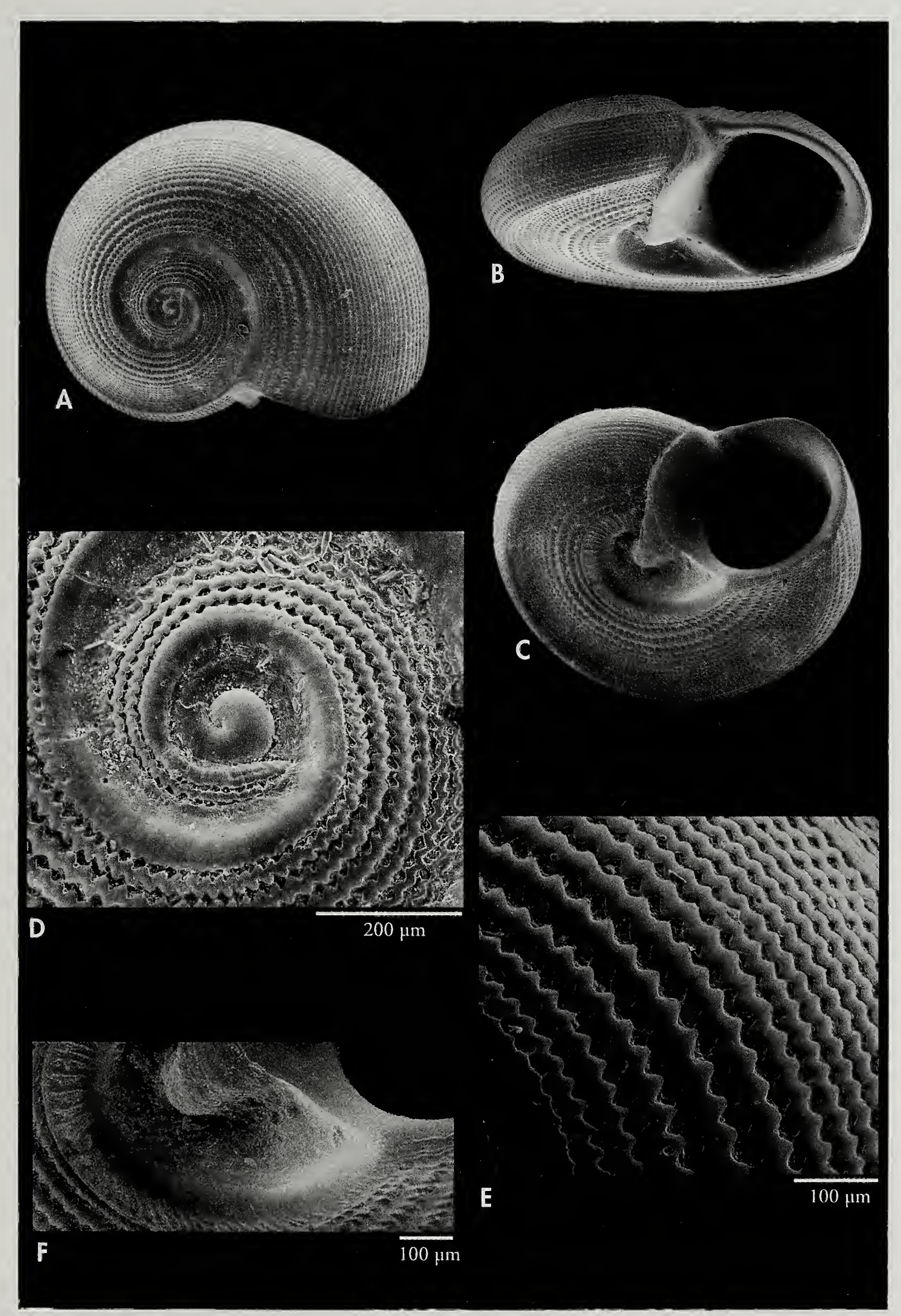


Figure 64A-F. *Anticlimax simplicissima* spec. nov. A-C: holotype, 2.3 mm (MNHN); D: protoconch (holotype); E-F: microsculpture. Alexishafen, Papua New Guinea, Stn. PD31, 1-6 m.
Figura 64A-F. Anticlimax simplicissima *spec. nov. A-C: holotipo, 2,3 mm (MNHN); D: protoconcha (holotipo); E-F: microescultura. Alexishafen, Papua Nueva Guinea, Stn. PD31, 1-6 m.*

beginning of the last whorl, one peripheral and the other one basal; both disappear in the last quarter whorl.

The spire and the space between the carinae is convex; the base is slightly convex in its central area and concave in the area bordering the basal carina. Umbilicus funnel shaped, limited by a thick spiral cord with axial ridges on its surface; umbilical wall smooth. Aperture rounded, prosocline; parietal area covered by a thick callus that extends into the interior of the umbilicus, occluding it; columella arched, thick, not reflected; outer lip thickened, smooth at its margin, only modified by a slight internal angle caused by the basal carina.

Dimensions: the holotype measures 2.3 mm in diameter.

Habitat: Infralittoral species collected between 1-6 m in depth.

Remarks: *A. simplicissima* is very different from all other species studied and known. The species is characterized by the protoconch, which stands at a level lower than the whorls of the teleoconch; the thick subsutural cord and the thick and striated periumbilical cord; the regularity of the zigzagging in cords and spiral grooves; the weak carinae; the parietal callus that penetrates inside the umbilicus and the particular funnel shaped umbilicus.

Its ornamentation in zigzag is very similar to that of other species such as *A. discus*; the fact that the protoconch is partially covered by the first whorl of the teleoconch, approximates it to *A. lentiformis*, *A. discus* and *A. religiosa*.

Anticlimax virginiae spec. nov. (Figures 8C, 65A-G)

Type material: Holotype MNHN 27215 (Figs. 8C, 65A-C).
Material examined: Only from the type locality.
Type locality: Vanuatu, Malparavu Island, 15°22.2'S, 167°11.3'E, 2-3 m [SANTO 2006: Stn. LD09].
Etymology: The specific name is after Virginie Héros, Assistant curator of Molluscs, an important person in the malacological studies in the MNHN.

Distribution: Only known from the type material between 2 and 3 m.

Description: Shell small (<2 mm), robust, wider than high, formed by about 4 whorls, narrowly umbilicate. Protoconch with 2 ¼ whorls, measuring 420 μm. Although it is seemingly smooth, under magnification it is completely covered by microgranules; the end is evident with the microsculpture of the teleoconch. Teleoconch with 2 whorls showing 2 thick peripheral carinae which angle the shell, one located on the adapical part and the other in the middle of the periphery; shell markedly convex from the second carina to the umbilicus. The whole teleoconch is covered by spiral cords, narrower than their interspaces, within which are distributed fine axial striae and microtubercles.

Aperture oval, very thick; parietal area with a thick callus forming an angle; columella very thick, inclined and reflected towards the umbilicus, forming a thick callus which occludes it completely; outer lip very thick, not modified by spiral cords nor expanded laterally by the peripheral carina. There is a broadened triangular area at the junction with the columella. Umbilicus completely occluded by the thickening and reflection of the columella.

Operculum multispiral with a central nucleus.

Dimensions: the holotype measures 1.93 mm in diameter.

Habitat: Infralittoral species found in sediments collected at 2-3 m in depth.

Remarks: The general shape of the shell comes closer to genus *Panastoma* PILSBRY & OLSSON, 1952. The lack of zigzagging cordlets, the thick columellar callus that occludes the umbilicus by the reflection of the columella itself and the outer lip not prolonged by the spiral cords, are characters which leave no doubt about its position in the genus *Anticlimax*.

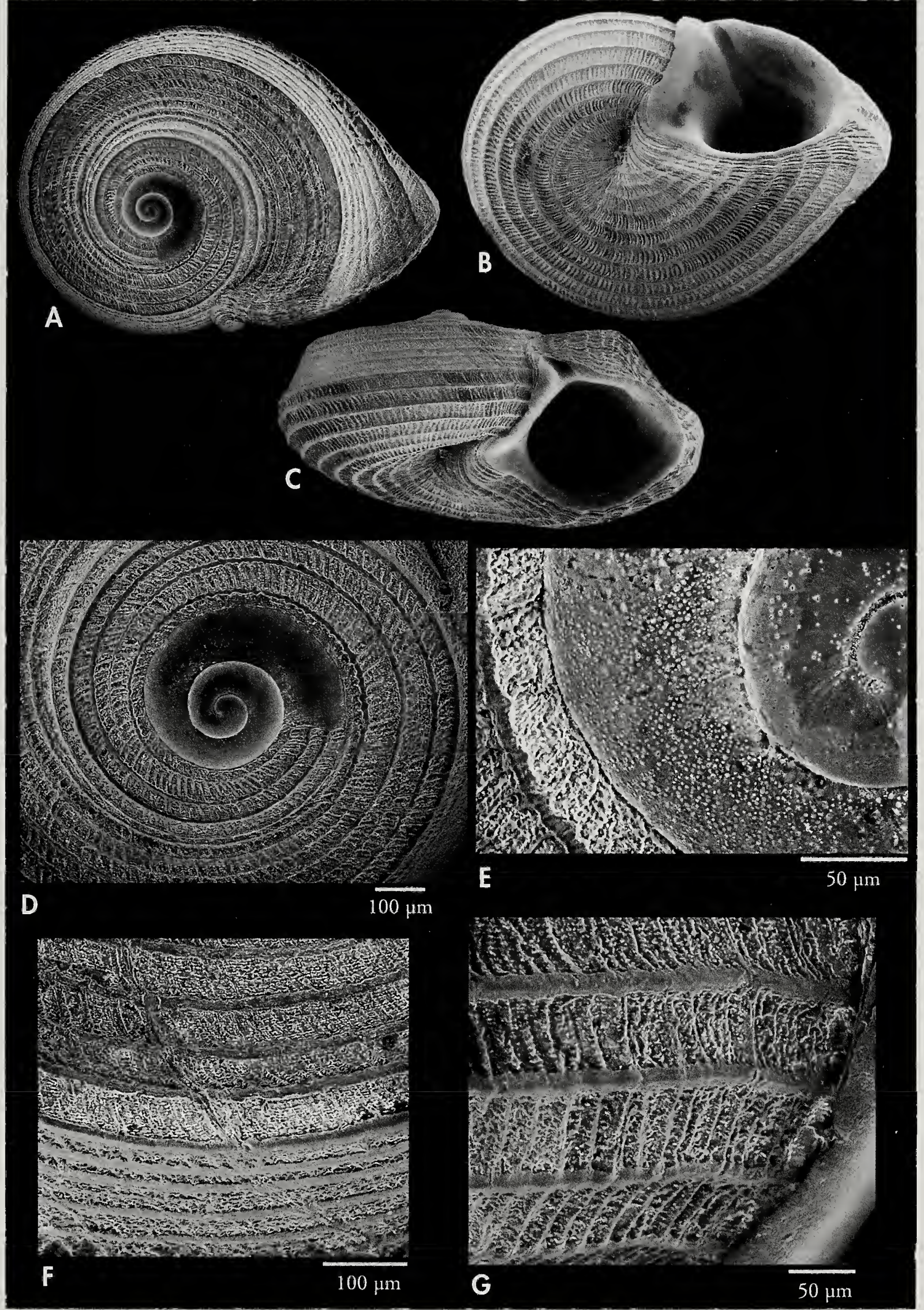


Figure 65A-G. *Anticlimax virginiae* spec. nov. A-C: holotype, 1.93 mm (MNHN); D: apical view and protoconch (holotype); E: detail of the microsculpture of the protoconch; F-G: microsculpture and detail. Vanuatu, Malparavu Island, Stn. LD09, 2-3 m.

Figura 65A-G. Anticlimax virginiae *spec. nov. A-C: holotipo, 1,93 mm (MNHN); D: visión apical y protoconcha (paratipo); E: detalle de la microescultura de la protoconcha; F-G: microescultura y detalle. Vanuatu, Isla de Malparavu, Stn. LD09, 2-3 m.*

Ungrouped species

Species included here are very different to any other in the genus and do not need to mention differential characters.

Anticlimax religiosa spec. nov. (Figures 8D, 66A-E)

Type material: Holotype MNHN 27216 (Figs. 8D, 66A-C).
Material examined: Only from the type locality.
Type locality: Philippines, Pamilacan Island, 9°29.4'N, 123°56.0'E, 15-20 m, hard ground covered with sand [PANGLAO 2004: Stn. S22].
Etymology: The specific name is referred to the similarity of the shell with a religious bonnet.

Distribution: Only known from its type locality between 15 and 20 m.

Description: Shell very small (<1.50 mm), wider than high, formed by 3 whorls profusely decorated, not umbilicate. The protoconch measures at least 245 μm in diameter and has approximately 1 ½ whorls, is apparently smooth and has 2 distinct phases; it is partially concealed by the subsequent whorl. The teleoconch has 1 ½ whorls, is bicarinate, with a peripheral and a basal carina. Ornamentation formed by zigzagging cords and grooves covering all the shell, including the umbilical callus; 18 cords between the suture and the peripheral carina can be observed from the last ½ whorl, 9 between the peripheral carina and the basal one, 10-11 on the base and 9 on the umbilical callus. Each whorl tends to cover largely the previous one. Adapical part and the space between carinae are slightly concave; base flat.

Umbilicus narrow and deep, almost completely covered by the umbilical callus. Aperture triangular, parietal area with a thick callus; columella arched, thickened and reflected towards the umbilicus, forming a large callus which occludes it almost completely; outer lip modified by the carinae which expand it laterally.

Dimensions: the holotype size is 1.40 mm in diameter and 0.64 mm in heigth.

Habitat: Infralittoral species suctioned at 15-20 m on hard ground covered with sand bottom.

Remarks: The shell resembles a bonnet in shape (a religious cap). The species is characterized by its shape; by the regular ornamentation of cords and grooves in zigzag which are distributed by the whole shell; for the flattened space between carinae; the shape of the outer lip, modified by the two carinae and the umbilical callus which is covered by cords and spiral grooves in zigzag and covering the umbilicus to leave it reduced to a small fissure.

Anticlimax obesa spec. nov. (Figures 8E, 67A-F, 68A-F)

Type material: Holotype MNHN 27217 (Figs. 8E, 67A-C).
Material examined: (2 s): Philippines, AURORA 2007: 1 s, Stn. DW2739, 16°05'N, 121°58'E, 96 m (type material). Papua New Guinea, PAPUA NIUGINI: 1 s, Yomba I., Beach, Stn. PD74, 5°14.7'S, 145°47.4'E, 1-3 m.
Type locality: Philippines, NO "Da-Bfar", 16°05'N, 121°58'E, 96 m [AURORA 2007: Stn. DW2739].
Etymology: The specific name refers to the portly aspect of the shell.

Distribution: Only known from the Philippines at 96 m and from Papua New Guinea between 1 and 3 m.

Description: Shell small (size >5.00 mm); very strong and robust, wider than high, with a very low spire, carinate and widely umbilicate. The protoconch has 1 ¼ whorls, measuring about 330 μm and being apparently smooth or slightly rough. The first whorl of the

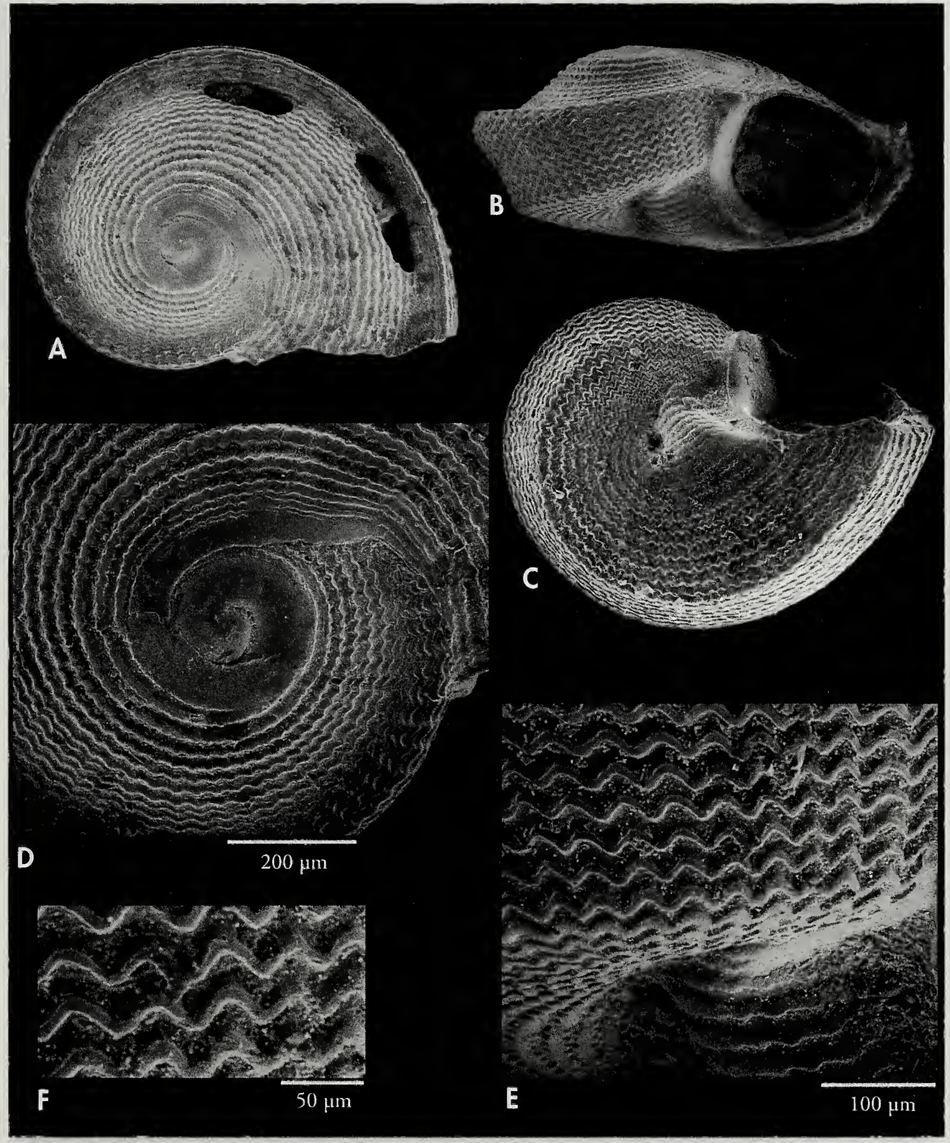


Figure 66A-F. *Anticlimax religiosa* spec. nov. A-C: holotype, 1.4 mm (MNHN); D: protoconch of the holotype; E-F: sculpture and detail. Philippines, Pamilacan Island, PANGLAO 2004, Stn. S22, 15-20 m on hard ground covered with sand bottom.

Figura 66A-F. Anticlimax religiosa *spec. nov. A-C: holotipo, 1,4 mm (MNHN); D: protoconcha del holotipo; E-F: escultura y detalle. Filipinas, Isla de Pamilacán, PANGLAO 2004, Stn. S22, 15-20 m, fondo duro con arena.*

teleoconch tends to cover partially the protoconch.

The teleoconch has 3 whorls, is bicarinate, with one peripheral and another periumbilical carinae; ornamentation composed of spiral cords, grooves or rounded cells in the interspaces between the cords, ribs and axial folds. On the adapical part at the beginning of the teleoconch 4-5 thick cords are observed, which are

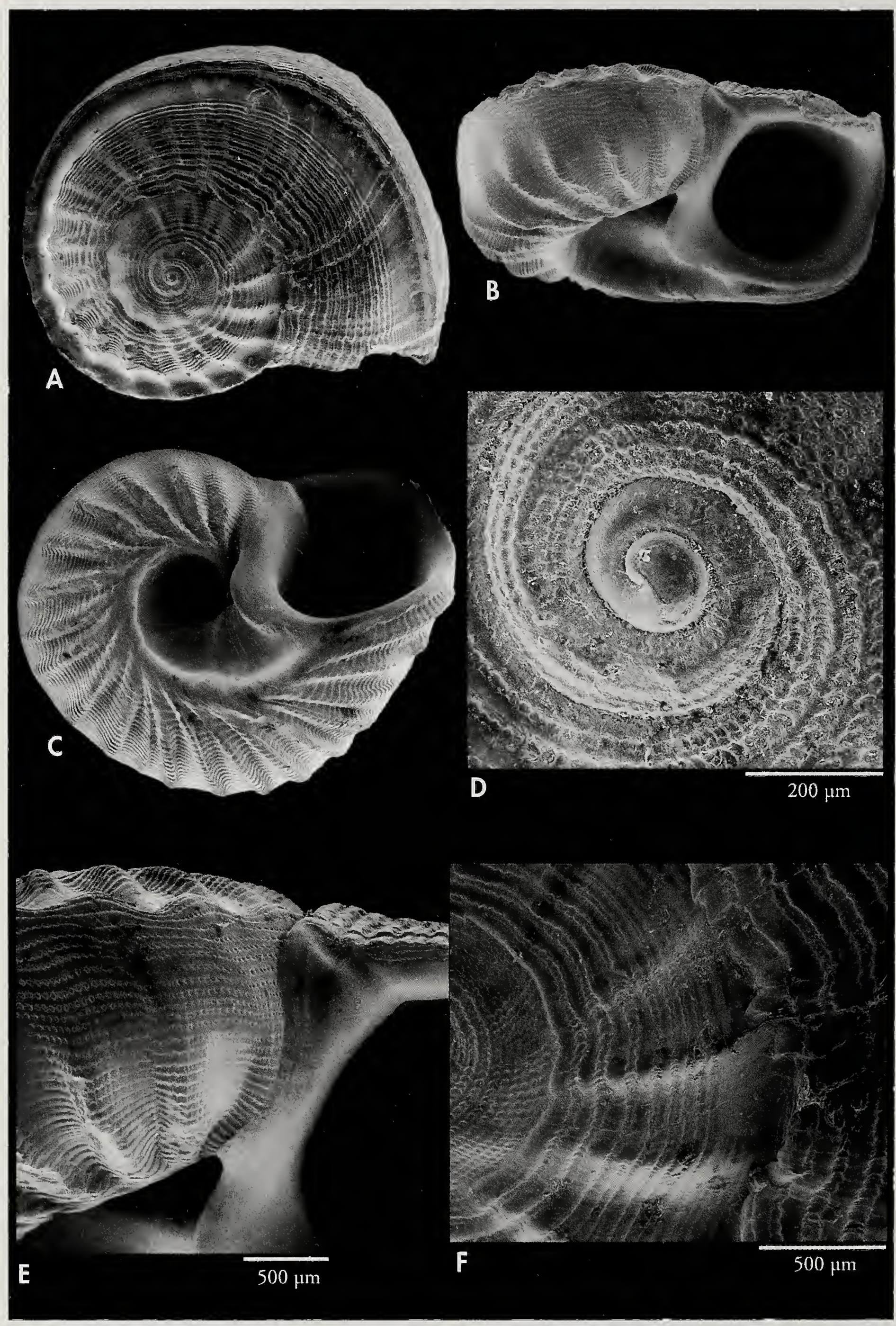


Figure 67A-F. *Anticlimax obesa* spec. nov. A-C: holotype, 5.9 mm (MNHN); D: protoconch of the holotype; E-F: microsculpture. Philippines, AURORA 2007, Stn. DW2739, 96 m.
Figura 67A-F. Anticlimax obesa *spec. nov. A-C: holotipo, 5,9 mm (MNHN); D: protoconcha del holotipo; E-F: microescultura. Filipinas, AURORA 2007, Stn. DW2739, 96 m.*

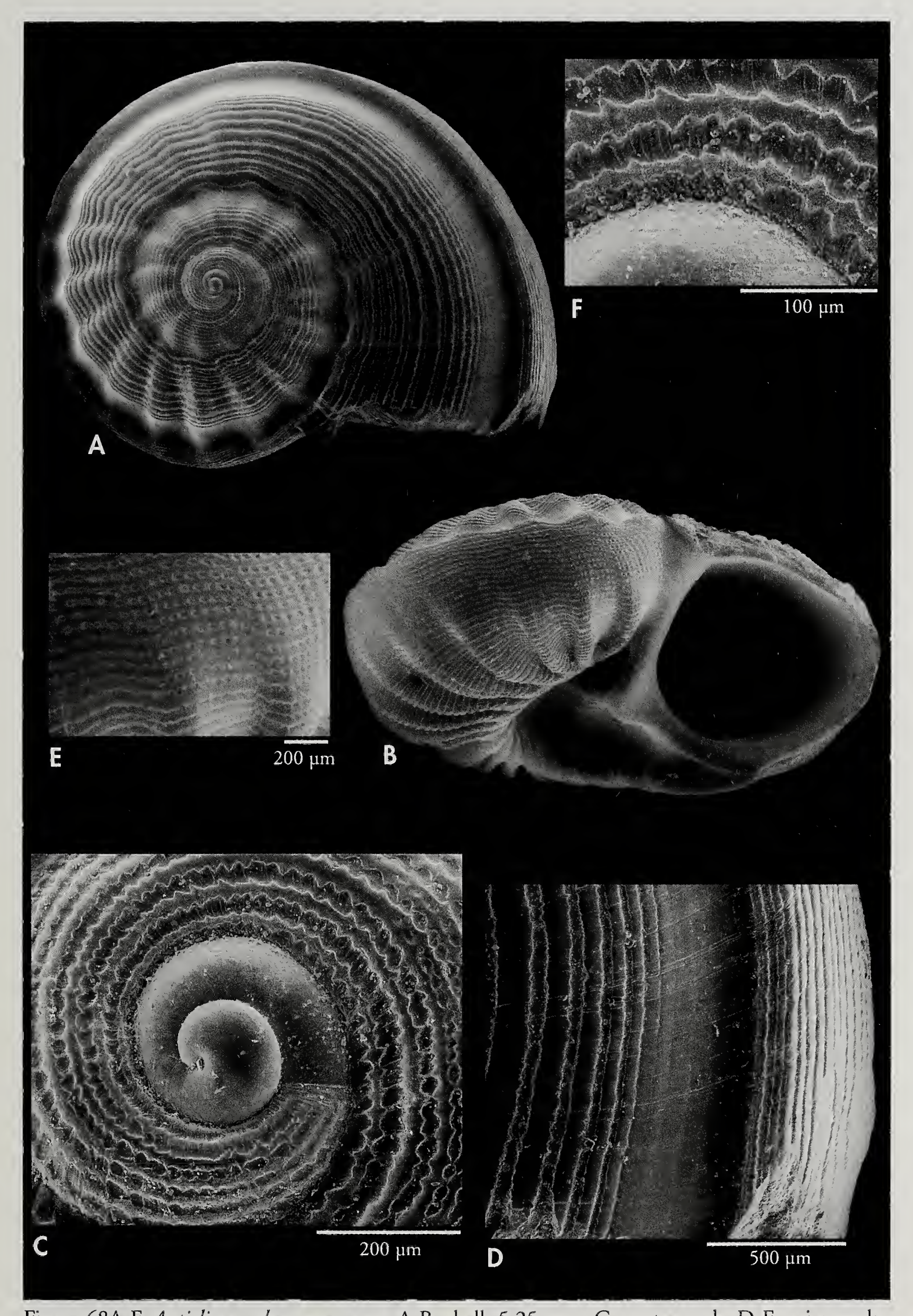


Figure 68A-F. *Anticlimax obesa* spec. nov. A-B: shell, 5.25 mm; C: protoconch; D-F: microsculpture. Papua New Guinea, Yomba Island, Stn. PD74, 1-3 m.

Figura 68A-F. Anticlimax obesa *spec. nov. A-B: concha, 5,25 mm; C: protoconcha; D-F: microescultura. Papua Nueva Guinea, isla de Yomba, Stn. PD74, 1-3 m.*

crossed by fine axial ribs, forming small nodules at the intersections and with deep cells of rounded aspect in the spaces between the cords.

After the first whorl, thick axial folds appear, which elevate the spire in relation to the peripheral carina; the nodules of the cords disappear and the cells are transformed into continuous grooves. On the last whorl, on the adapical part, about 20 strong axial folds and 12-13 spiral cords can be seen. There is no basal carina. From the peripheral to the periumbilical carinae, there are spiral cords and quadrangular cells in the interspaces; near the base and down to the periumbilical carina 19 large axial folds are present. Umbilicus wide and deep, externally delimited by a carina which angles it; a very large cord originates from the thickening of the columella and continues internally; umbilical wall smooth, with only growth lines.

Aperture quadrangular, slightly prosocline; parietal area covered by a very thick callus; columella arched, very thick and reflected towards the umbilicus, forming a thick callus which also constitutes the cord inside the umbilicus. External lip with an edge not modified by the spiral cords, with an internal angle formed by the peripheral carina, which does not expand the lip laterally.

Dimensions: holotype measures 5.9 mm in diameter and 3.1 mm in height.

Habitat: Species of the infra- and circalittoral. In the Philippines dredged at 96 m in depth; in Papua New Guinea collected between 1 and 3 m in depth.

Remarks: *Anticlimax obesa* spec. nov. is characterized by the relatively largest size (5.0 mm) and the robustness of the shell; by the position of the peripheral carina; by the thick periumbilical cord; by many folds that thrust from the base and by its quadrangular aperture.

Anticlimax juanae spec. nov. (Figures 8F, 69A-G, 70A-F, 71A-E)

Type material: Holotype MNHN 27218 (Figs. 8F, 69A-C).

Material examined: (9 s): New Caledonia, LIFOU 2000: 1 s, Stn. 1426, Huneté, Baie du Santal, Loyalty Is., 20°45.9'S, 167°06.2'E, 4-7 m (type material). Philippines, PANGLAO 2004: 1 s, Stn. B41, Balicasag Island, 9°30.9'N, 123°40.8'E, 17-19 m, floor of large cave; 1 s, Bohol Island, Maribohoc Bay, Stn. T14, 9°42'N, 123°49'E, 101-110 m, mud with shells; 1 s, Doljo Point, Panglao Island, Stn. M5, 9°35.5'N, 123°43.3'-123°44.3'E, 0-2 m, mixed intertidal platform, fringe mangrove, seagrass; 2 s, Baclayon, Bohol Island, Stn. S2, 9°37.4'N, 123°54.5'E, 4-5 m, hard bottom with small sediment patches; 1 s, Stn. B21, 9°37.2'N, 123°46.4'E, 20-21 m, reef wall with small caves; 1 s, Bohol Island, Ubajan, Stn. S25, 9°41.5'N, 123°51.0'E, 21 m, mud; 1 s, Panglao Island, Napaling, Stn. B8, 9°37.1'N, 123°46.1'E, 3 m, subtidal reef platform.

Type locality: New Caledonia, Huneté, Baie du Santal, Loyalty Is., 20°45.9'S, 167°06.2'E, 4-7 m [LIFOU 2000: Stn. 1426].

Etymology: The specific name is after Juana Maria Lijó Ageitos, from Valencia, Spain, a good friend of the first author.

Distribution: Loyalty Is., in New Caledonia between 4-7 m and the Philippines between 2 and 101 m.

Description: Shell small (>2.00 mm), very strong, robust, bicarinate, densely ornamented and narrowly umbilicate; formed by 3 ¾ whorls; last whorl covering most of the previous whorls. The protoconch is situated on a lower level and is partially covered by the first whorl of the teleoconch. It has 1 ¼ whorls, measuring 220 μm, is slightly rough and comprises 2 phases separated by a lip thickening. The teleoconch has 2 ½ whorls and shows two thick carinae, one basal and the other periumbilical, developed in zigzag.

Ornamentation formed by thick axial ribs that begin at the suture zone and end at the basal carina; by other shorter thick ribs that unite the basal and periumbilical carinae; also by spiral cordlets separated by deep grooves, in which fine axial striae can be seen. These cordlets are extended in zigzag and are distributed

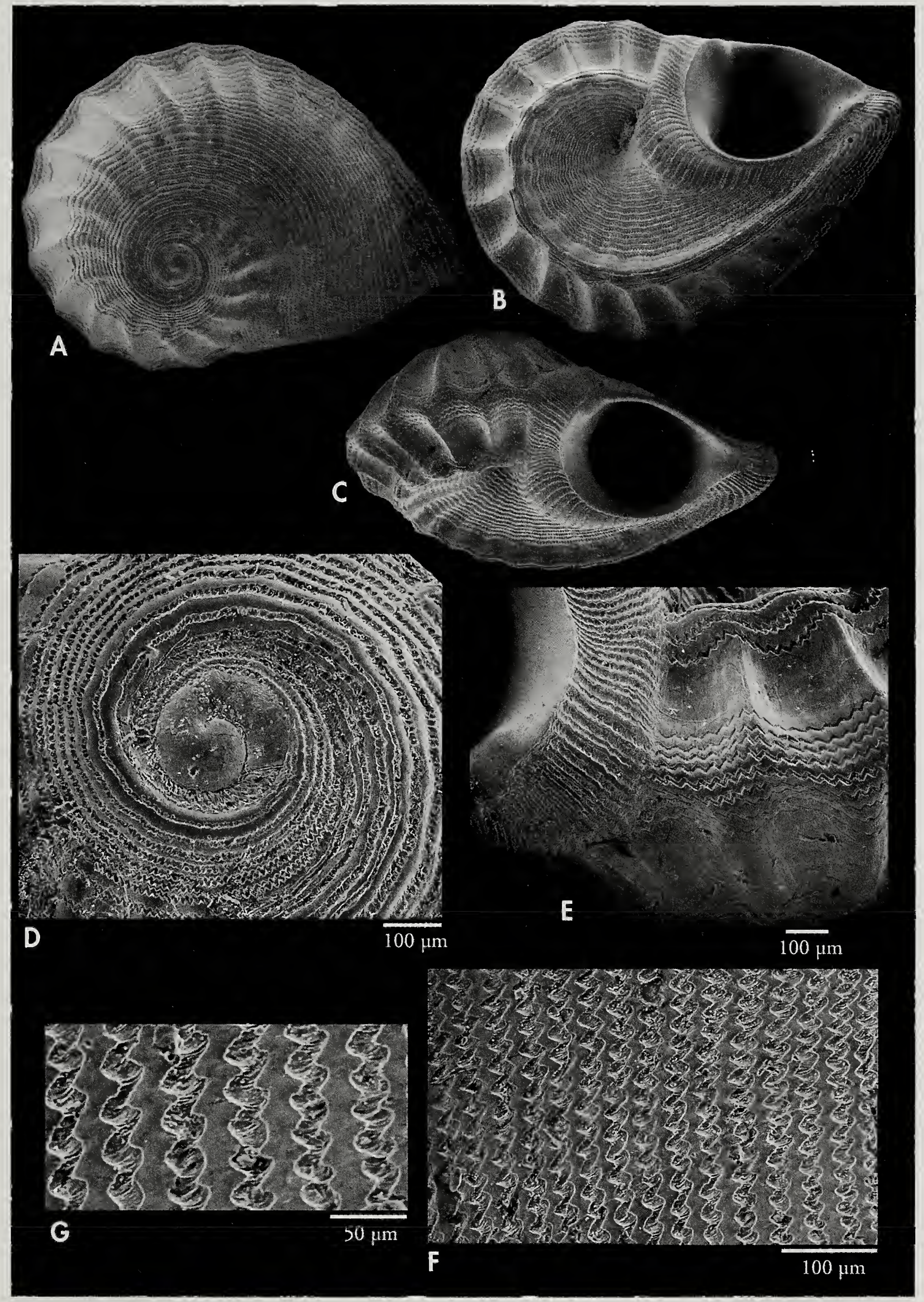


Figure 69A-G. *Anticlimax juanae* spec. nov. A-C: holotype, 2.55 mm (MNHN); D: protoconch (holotype); E-F: microsculpture; G: detail. New Caledonia, Loyalty Is., Santal Bay, in front of Huneté, Stn. 1426, 4-7 m, bottom of small rocks in sandy areas.

Figura 69A-G. Anticlimax juanae *spec. nov. A-C: holotipo, 2,55 mm (MNHN); D: protoconcha (holotipo); E-F: microescultura; G: detalle. Nueva Caledonia, Islas de Loyauté, Bahía de Santal, frente a Huneté, Stn. 1426, 4-7 m, fondo de pequeñas rocas en áreas arenosas.*



Figure 70A-F. *Anticlimax juanae* spec. nov. A-B: shell, 1.9 mm, Philippines, Doljo Point, Panglao Island, Stn. M5, 0-2 m; C-D: shell, 2.0 mm, Philippines, Napaling, Panglao Island, Stn. B8, 3 m; E: protoconch; F: microsculpture.

Figura 70A-F. Anticlimax juanae *spec. nov. A-B: concha, 1,9 mm, Filipinas, Punta Doljo, Isla de Panglao, Stn. M5, 0-2 m; C-D: concha, 2,0 mm, Filipinas, Napaling, Isla de Panglao, Stn. B8, 3 m; E: protoconcha; F: microescultura.*

over all the teleoconch; 28 cords can be observed along the outer lip, from the suture to the basal carina, 11-12 cords from the basal to the periumbilical carinae and 15-16 inside the umbilical area.

Aperture triangular; parietal area with a thick callus; columella curved, thick, reflected towards the umbilicus; both the umbilical and the parietal callus are covered by zigzagging spiral cords;

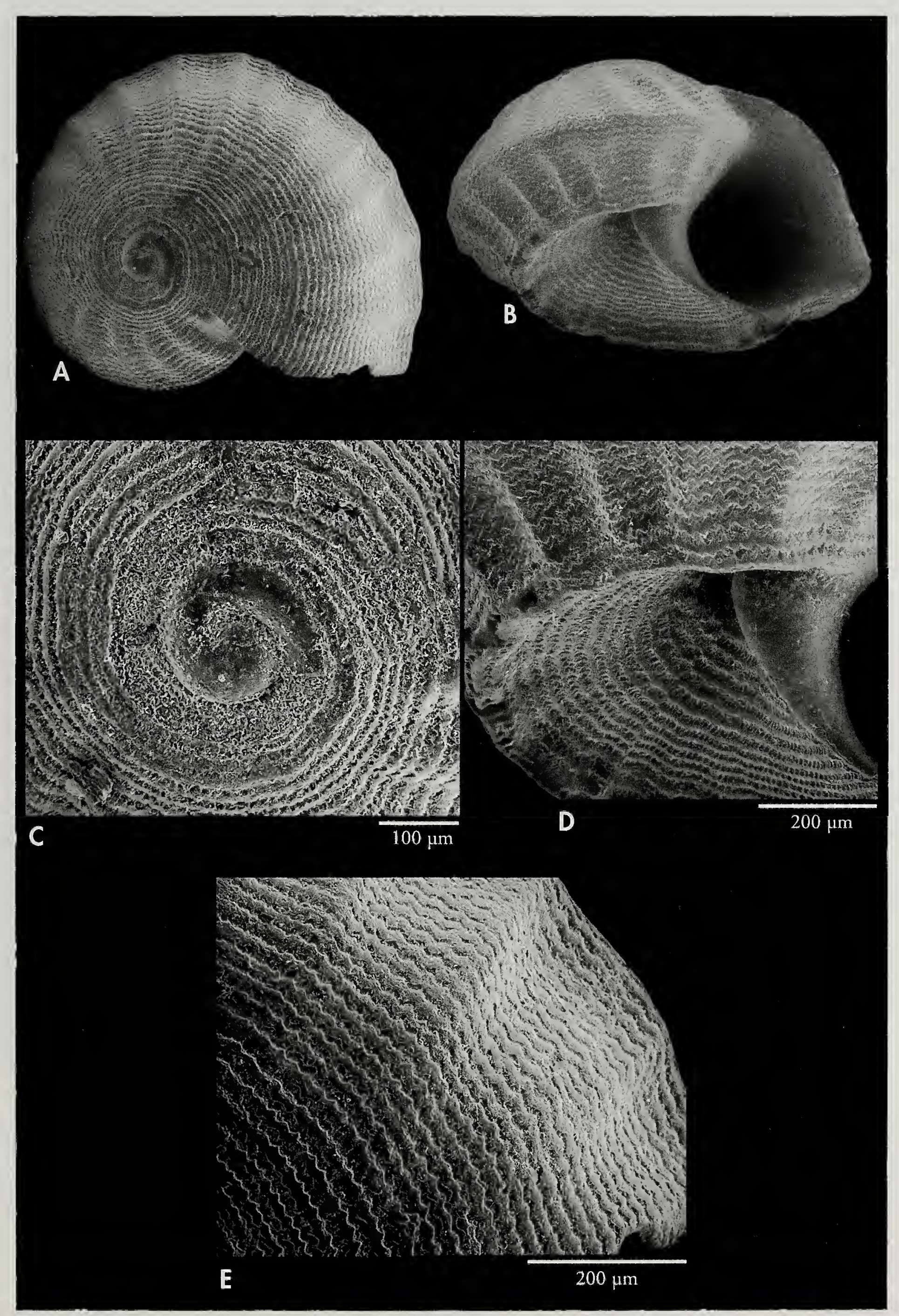


Figure 71A-E. *Anticlimax juanae* spec. nov. A-B: juvenile shell, 1.4 mm; C: protoconch; D-E: microsculpture. Philippines, Bohol Island, Maribohoc Bay, Stn. T14, 101-110 m.
Figura 71A-E. Anticlimax juanae *spec. nov. A-B: concha juvenil, 1,4 mm; C: protoconcha; D-E: microescultura. Filipinas, Isla de Bohol, Bahía de Maribohoc, Stn. T14, 101-110 m.*

outer lip thick, modified by the basal carina which prolongs it laterally. Umbilicus small and deep, almost occluded by the thickening of the columellar callus; umbilical area funnel-shaped, with very weak axial ribs inside.

Dimensions: the holotype is 2.55 mm in diameter.

Habitat: Infralittoral-circalittoral species found on a bottom of small stones with patches of sediment at 4-7 m in depth from Loyalty Is., New Caledonia. The specimens from the Philippines were collected at 3 m, brushing on a subtidal reef platform (Stn. B8); at 20-21 m, brushing on reef wall with small caves (Stn. B21); at 17-19 m, brushing on the floor of large caves (Stn. B41); at 0-2 m in mixed intertidal platform, fringe mangove, seagrass (Stn. M5); at 4-5 m, on a hard bottom with patches of sediment (Stn. S2) and at 101-110 m, trawled in mud with shells (Stn. T14).

Remarks: This is one of the species with the most densely ornamented shell among all the studied material; the carinae and zigzagging cordlets plus the thick axial ribs are characters which differentiate this species from its congeners.

Only two bands, one near the basal carina and another between the basal and periumbilical carinae appear without spiral cords or grooves in the studied specimen, from Loyalty Is., Baie du Santal (Fig. 69). This specimen also has a protoconch that is somewhat larger in diameter (245 μm), as well as a lower number of axial folds between the basal and the periumbilical carinae. All these differences are not enough for specific differentiation, so we group all studied specimens from both Loyalty Is. and the Philippines within the same species.

The 10 samples from Philippines studied, have the same ornamentation, without smooth bands, contrary to what happens in the single specimen from Loyalty Islands; only in the case of finding new specimens exhibiting such smooth zones could we think of a specific separation.

Other species studied

Anticlimax rostrata (Hedley, 1900) (Figures 72A-C)
Anticlimax cf. *rostrata* (Figure 72E-F)

Liotia rostrata Hedley, 1900 (original combination). *Proc. Linn. Soc. N.S.W.* 24(3): 502, pl. 26, figs. 4-7. [Type locality: off Cape York, Torres Strait].
Lioprora rostrata (Hedley, 1900): Laseron (1958). *Records of the Australian Museum* 24(11): 169, figs. 25-27.
Canimarina rostrata (Hedley, 1900): Faber (2012). *Miscellanea Malacologica* 5(5): 94.

Type material: Holotype deposited in the Australian Museum (c. 8100), examined by photographs (Figs. 72A-C).
Other material studied: 1 s, Papua New Guinea, S Urembo I., outer slope, PAPUA NIUGINI: Stn PS43, 05°15.9'S, 145°47.1'E, 14 m (Figs. 72E-F), in this paper as *Anticlimax cf. rostrata*.

Remarks: Originally, Hedley (1900) placed the species in the genus *Liotia*, but with doubts. Laseron (1958) created the genus *Lioprora* and places *Liotia rostrata* as the type species, mentioning: *"The rostrate aperture of Lioprora should alone be sufficient to establish its generic identity"*.

Faber (2012) discusses the synonymy of *Canimarina* with *Anticlimax* made by Rubio *et al.* (2011); he considers *Canimarina* a valid genus and includes in it *Anticlimax crassilabris*, *A. glaber* and *Lioprora rostrata*.

As we have stated previously (Rubio *et al.* 2011), we continue to consider *Canimarina* a junior synonym of *Anticlimax*, and therefore *Lioprora* Laseron, 1958 must be considered a synonym of *Anticlimax* and *Lioprora rostrata* Hedley, 1900 should be placed in the genus *Anticlimax*, changing its name to *Anticlimax rostrata* (Hedley, 1900).

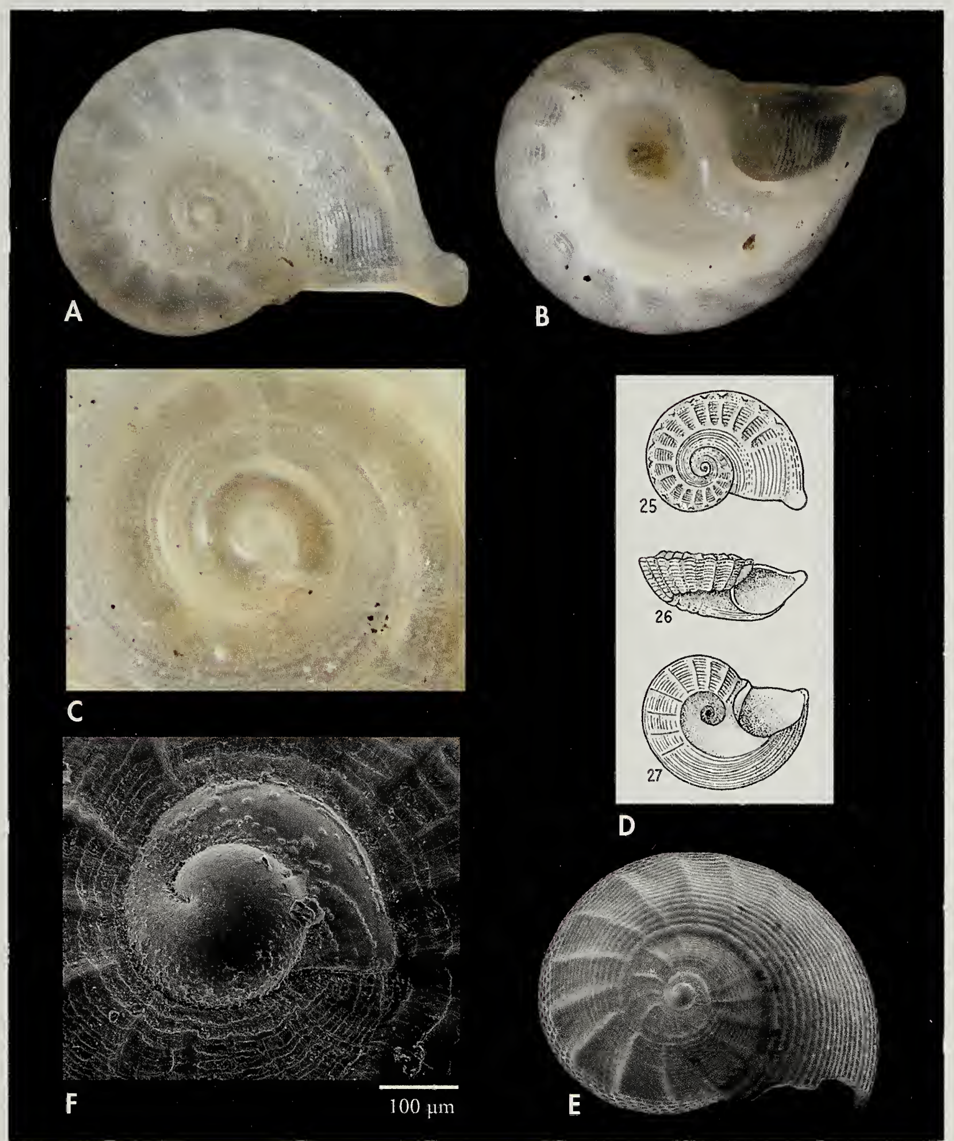


Figure 72A-E. *Anticlimax rostrata* (Hedley, 1900). A-B: holotype, 2.8 mm (Australian Museum, c.8100); C: protoconch of the holotype; D: original figures. E-F: *Anticlimax* cf. *rostrata*, 2.55 mm and protoconch, S Urembo Island, Papua New Guinea, Stn PS43, 14 m.

Figura 72A-E. Anticlimax rostrata *(Hedley, 1900). A-B: holotipo, 2,8 mm (Australian Museum, c.8100); C: protoconcha del holotipo; D: figura original. E-F:* Anticlimax *cf.* rostrata, *2,55 mm y protoconcha, S Isla de Urembo, Papua Nueva Guinea, Stn PS43, 14 m.*

This species is characterized by its spire which is developed almost on the same plane, its particular ornamentation and the broad funnel shaped umbilicus.

The specimen studied and identified as *Anticlimax* cf. *rostrata* presents morphological characters that we can identify in the holotype as a flattened spire and

the axial costulation seen on the adapical part; however, it has no axial ribs on the periphery and the base. This specimen is apparently not an adult and therefore has not fully developed either the aperture or the characteristic angulation of the outer lip that expands the aperture laterally.

The protoconch apparently has less whorls, measuring about 335 μm and has developed two phases; the first shows a rough surface and the second has thick tubercles, that sometimes appear aligned or, at other times, dispersed; the lip thickening separates it from the teleoconch.

Anticlimax sp. (Figures 73A-E)

Material studied: 1 s, Papua New Guinea, S Urembo I., PAPUA NIUGINI, Stn PS41, 05°15.9'S – 145°47.1'E, 10 m, outer slope.

Description: The protoconch has 1 ½ whorls measuring about 340 μm in diameter and there are 2 phases in its development; the first is situated on a tilted plane with respect to the axis of the shell and is slightly rough; the second phase shows some very small and scattered tubercles. The teleoconch has at least two whorls, is dorsally slightly convex and basally very convex and it has a thick peripheral carina. Ornamentation formed by spiral cords and axial ribs which intersect forming cells of different shapes and size. On the adapical part there are 6 spiral cords at the beginning of the teleoconch and 15-16 flatter ones at the end, between the suture and the peripheral carina.

The base is also completely covered by spiral cords intersected by axial ribs that starting from the umbilical margin go up to the peripheral carina. Umbilicus wide and deep, with smooth walls, not occluded by any callus, but limited by a carina formed by the thickening of the base of the columella. The aperture is quadrangular; the columella is thick and arched; the outer lip is angled centrally by the effect of the peripheral carina.

Dimensions: the studied shell measures 2.7 mm in diameter.

Remarks: *Anticlimax* sp. shows unique morphological characters that make it very different from *A. rostrata* and *A.* cf. *rostrata*, but the fact of having a single shell, it not being completely adult or if it is adult, having a broken aperture, makes it difficult for us to differentiate it specifically from congeneric species.

Other species in this genus

During the study of the tropical South Pacific species, it was necessary to make a comparison with other taxa previously known. Those from the Caribbean have been recently sampled and commented by Rubio, Fernández-Garcés & Rolán (2011). For the Caribbean species we refer the reader to that work.

Other species in the Pacific area are:

Anticlimax niasensis (Thiele, 1925) (Figures 74A-F)

Discopsis niasensis Thiele, 1925. *Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia"* 1898-1899. 17 (2): 76, pl. 5, figs. 34-6. [Type locality: Indian Ocean, Stat. 193: off Sumatra, S of Nias, (0°30.2'N, 97°59.07'W)].

Type material: Examined: Two dried shells (syntypes): one entire shell, 2 mm; the other syntype is a fragment deposited in Museum für Naturkunde, Berlin – Malakologie. (ZMB/Moll – 109214).
Type locality: Indian Ocean, Stat. 193: off Sumatra, S of Nias, (0°30.2'N, 97°59.07'W).

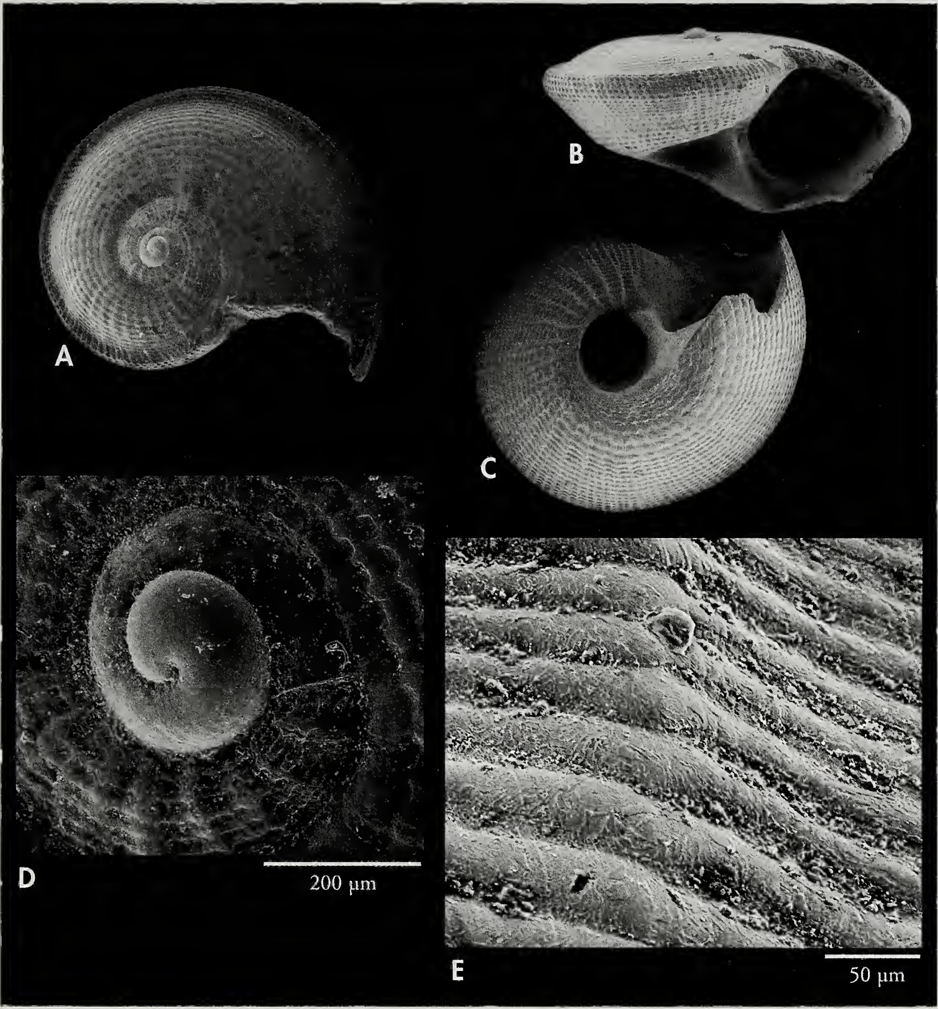


Figure 73A-E. *Anticlimax sp.* A-C: shell, 2.7 mm; D: protoconch; E: microsculpture. S Urembo I., Papua New Guinea, Stn. PS41, 10 m.
Figura 73A-E. Anticlimax *sp. A-C: concha, 2,7 mm; D: protoconcha; E: microescultura. S de Isla de Urembo, Papua Nueva Guinea, Stn. PS41, 10 m.*

Description: See THIELE (1925). The protoconch has a little more than 2 whorls with 280 μm in diameter and, in spite of its poor condition, some strong tubercles can be seen on its second whorl. The last half whorl of the protoconch is partially covered by the first whorl of the teleoconch; this makes the protoconch appear to be deflected in relation to the axis of the shell (Fig. 74E). The teleoconch, on the adapical part, appears covered by spiral cords with rounded cells in their interspaces; basally the shell is apparently smooth. A strong callus is developed behind the columella and occludes the umbilicus progressively.

Remarks: *A. niasensis* may be distinguished from *A. padangensis* by having a scarcely ornamented teleoconch, a more closed umbilicus and by the slight carina being situated in the middle of the periphery.

Anticlimax padangensis (Thiele, 1925) (Figures 75A-F)

Discopsis padangensis Thiele, 1925. *Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia"* 1898-1899. 17 (2):76, pl. 5, figs. 40-2. [Holotype - Type locality: Indonesia, Sumatra, Padang].

Type material: Holotype (ZMB/Moll-108506); one shell labelled as syntype (ZMB/Moll-109213) off Sumatra, S of Nias, 0°30'2"N, 97°59'7"W, Deutsche Tiefsee-Expedition
Type locality: Padang, Sumatra, Indonesia.

Description: See THIELE (1925). The protoconch has 2 whorls, with a diameter of about 300 μm and because of its poor condition we cannot see any ornamentation. Shell bicarinate: a peripheral and another basal carinae. The peripheral, is weakened towards the outer lip avoiding the forming of an angle; the basal carina expands the lip laterally and forms a strong projection of the outer lip. The space between the carinae is concave. The teleoconch is covered by spiral cords on the adapical part; basally the axial ribs are predominant. Umbilicus large allowing the previous whorls to be seen.

Remarks: For separation from *A. niasensis* see above in the remarks on this species.

Anticlimax carinata (A. Adams, 1863)

Adeorbis carinatus A. Adams, 1863. *Proc. Sci. Meet. Zool. Soc. London*, pp. 75 [Type locality: Seto-Uchi; Akasi (Akasi, Hyögo prefecture, Seto inland sea].
Vitrinella carinata (A. Adams, 1863): OKUTANI (2000). *Marine Mollusks in Japan*, pp. 173, pl. 86, fig. 2.

Type material: Syntype deposited in BMNH (1874.5.19.49) figured in HIGO, CALLOMON & GOTO (1999: G1010).

Description: Original description in A. ADAMS (1863): "*A. testa ovato-orbiculari, obliqua, depresso-conoidali, subdiaphana, alba, late umbilicata; anfractibus convexiusculis, transversim tenuiter striatis, rapide accrescentibus, ultimo antice dilatato, ad peripheriam acute carinato; apertura subtrigonali, antice angulata et producta, umbilico margine acuto*".

Habitat: Known only from shallow waters in the Seto Inland Sea (OKUTANI, 2000).

Remarks: A. ADAMS (1863: 75) comments: "The keel at the periphery is marked and prominent, forming an acute ledge around the last whorl. The only other species at all resembling it is *A. subcarinata*, found in the British seas".

OKUTANI (2000: 173) described the species as: "*Shell depressed conical, translucent white. Body whorl [f] lange* (sic)*large with sharply angulate periphery and flat base. Suture canaliculated on the body whorl. Outer lip of the aperture with a strong projection at its base*".

Anticlimax carinatus does not look at all like *Adeorbis subcarinatus* Montagu, 1803 (*Tornus subcarinatus*) but it has a great resemblance to the new described species *Anticlimax vanuatuensis* and *A. levis*, and the already described *A. niasensis*, mainly in the basal keel which is increased on the last whorl of the teleoconch and which gives it a characteristic shape. Although we could not examine the holotype despite having requested it to the NHMUK, we consider that it is a different species from *A. vanuatuensis*, *A. levis* and *A. niasensis* fundamentally due to its known distribution area.

Adeorbis carinatus A. Adams, 1863 must be placed in genus *Anticlimax*, changing its name to *Anticlimax carinatus* (A. Adams, 1863).

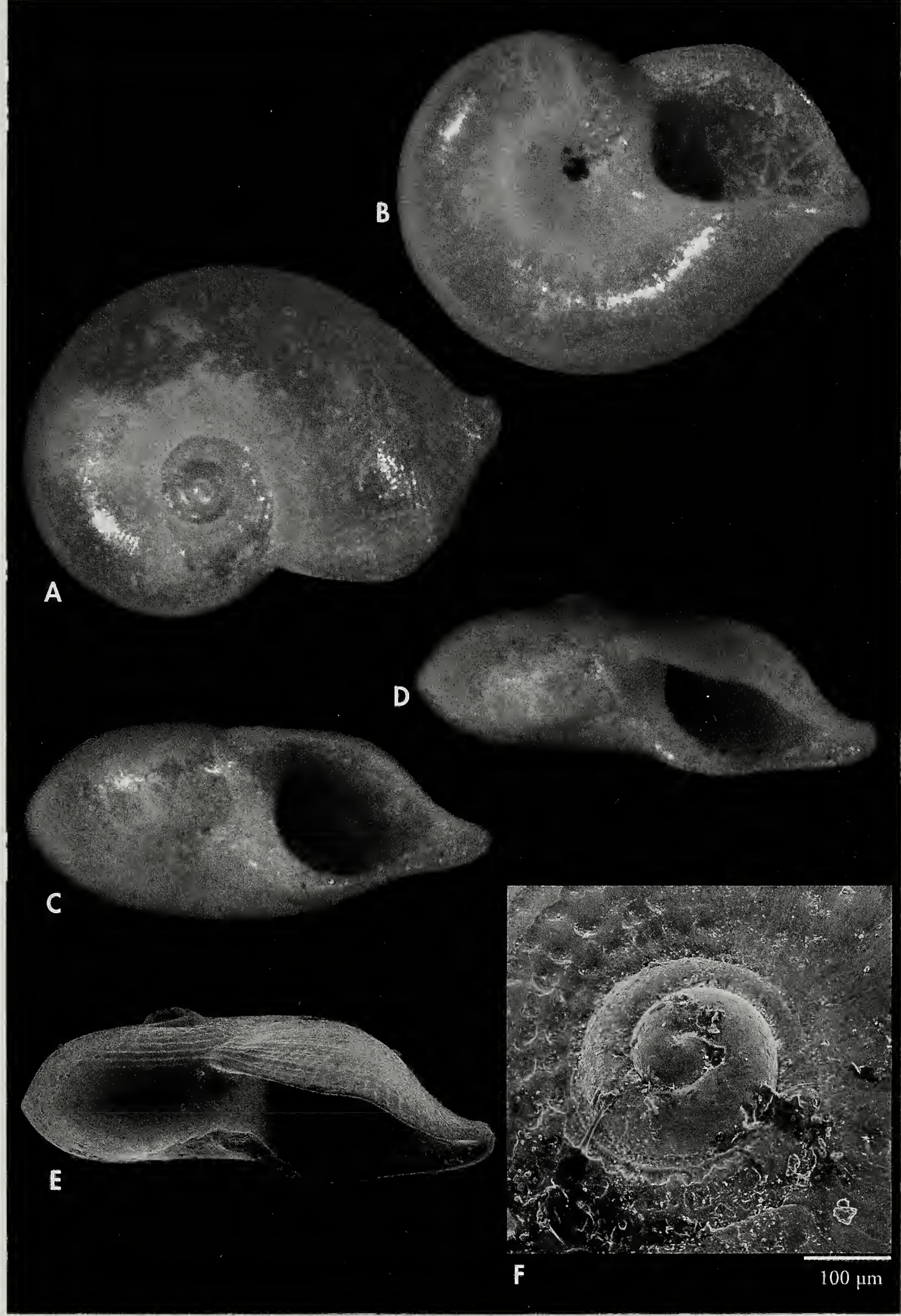


Figure 74A-F. *Anticlimax niasensis* (Thiele, 1925). A-E: syntype, 2 mm (ZMB, 109214). F: protoconch (syntype).
Figura 74A-F. Anticlimax niasensis *(Thiele, 1925). A-E: sintipo, 2 mm (ZMB, 109214). F: protoconcha (sintipo).*

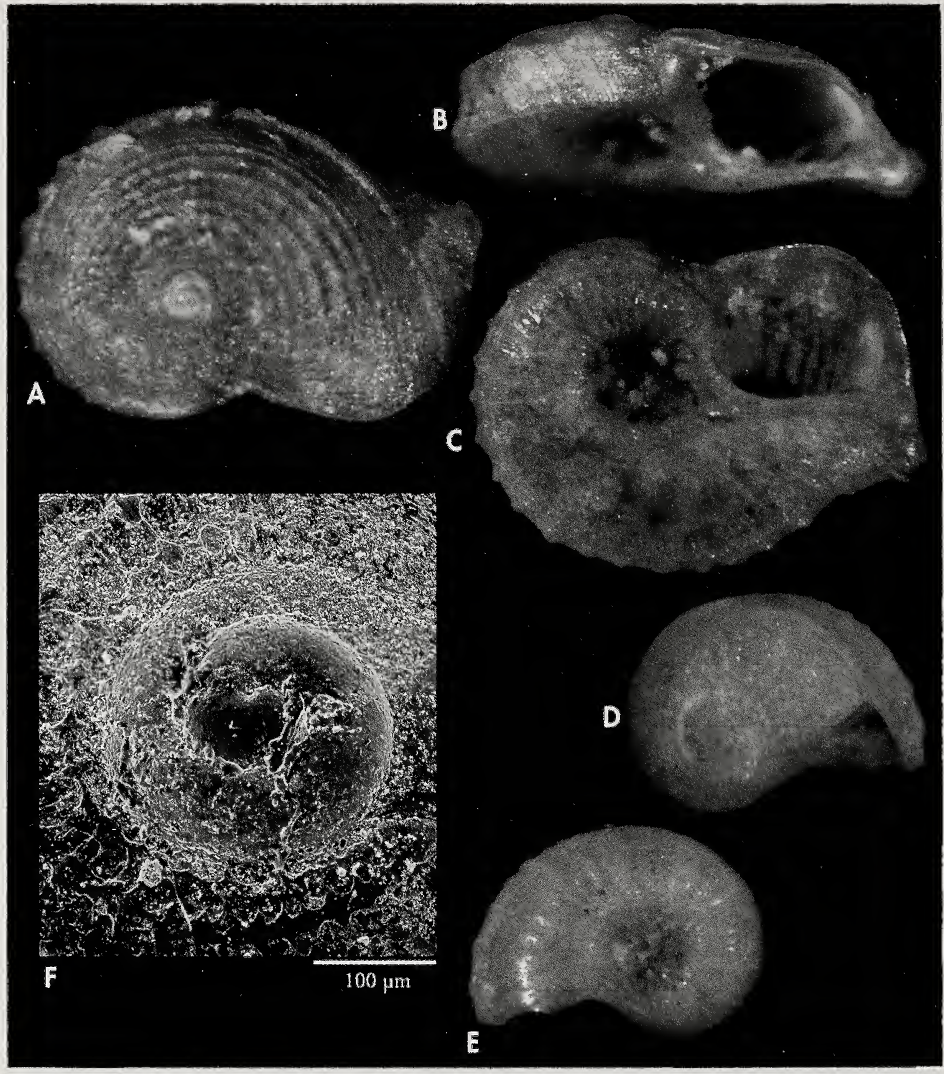


Figure 75A-E. *Anticlimax padangensis* (Thiele, 1925). A-C: holotype, 2 mm (ZMB, moll 108506). D-E: fragment, 1.2 mm, labelled as syntype, Sumatra (ZMB moll 109213); F: protoconch of this last fragment.

Figura 75A-E. Anticlimax padangensis *(Thiele, 1925). A-C: holotipo, 2 mm (ZMB, moll 108506). D-E: fragmento, 1,2 mm, etiquetado como sintipo, Sumatra (ZMB moll 109213); F: protoconcha de este último fragmento.*

Species not in the genus *Anticlimax*

Vitrinella arifca Bartsch, 1915 (Figure 76)

Vitrinella (Docomphala) arifca Bartsch, 1915. [Type locality: Port Alfred, South Africa].

Type material: Holotype and one paratype deposited in USNM (250554), come from Port Alfred (Coll. Num. 1427).

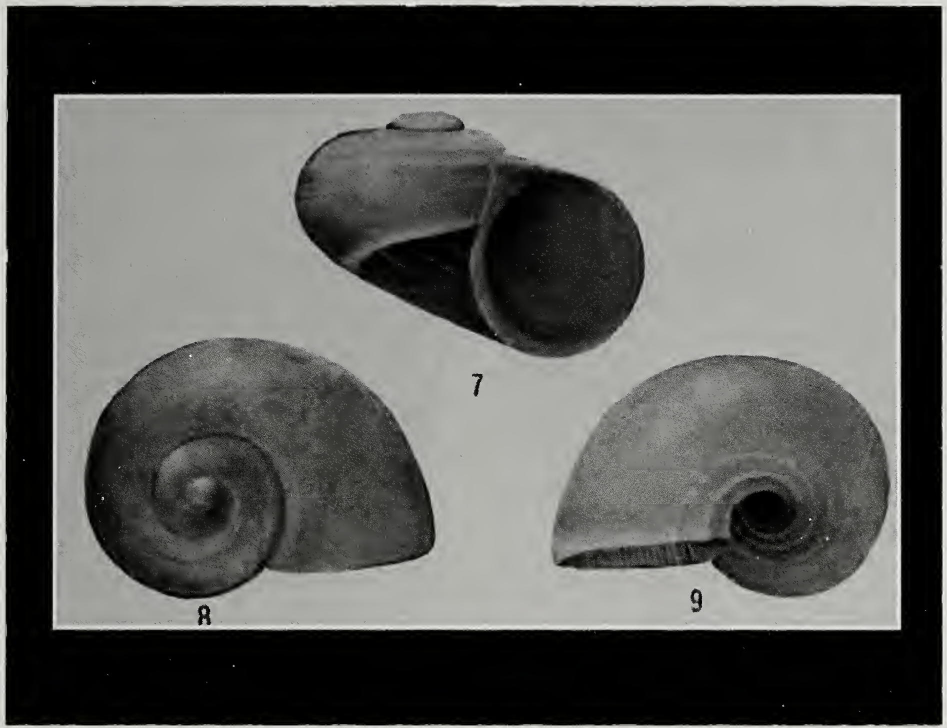


Figure 76. *Vitrinella (Docomphala) arifca* Bartsch, 1915. Original figuration in Bull. USNM, 91, Pl. 32, figs. 7-9.
Figura 76. Vitrinella (Docomphala) arifca *Bartsch, 1915. Representación original en Bull. USNM, 91, Pl. 32, figs. 7-9.*

Description: Original description in BARSTCH (1915: 168):*"Shell minute, rather thick, semitranslucent, bluish white. Nuclear whorls one and one-half, well rounded, polished, smooth. Postnuclear turns one and one-fourth, strongly rounded, marked by two slender spiral cords at the summit and microscopic spiral striations on the rest of the surface. In addition to the spiral sculpture the turns are marked by fine lines of growth. On the outer edge of the aperture a number of strongly incised spiral scratches make their appearance. Sutures well impressed. Periphery of the last whorl well rounded. Base well rounded, strongly umbilicated. The umbilicus is limited exteriorly by a strong, slightly tuberculated, spiral cord. Three additional, strongly tuberculated, spiral cords, which decrease in strength from the outer edge inward, mark the inner wall of the umbilicus. The posterior portion of the base, between the limiting spiral cord of the umbilicus and the periphery, is smooth, while the other half adjoining the spiral cord is marked by decidedly retractively slanting, oblique, slender, axial ribs which anastomose with the spiral cord limiting the umbilicus. Aperture circular; outer lip very thick; inner lip very strong and reflected, strongly curved within, the outer edge oblique and straight. The posterior angle of the aperture is filled by a strong callus. The type measures: altitude 0.6 mm; greater diameter 1.1 mm".*

Remarks: In World Register of Marine Species (WORMS) SARTORI (2013) places *Vitrinella (Docomphala) arifca* Bartsch, 1915 in genus *Anticlimax*, but considering it as *"Species Inquirenda"*.

In our opinion, on the basis of the description and original figuration, it is not an *Anticlimax*, and probably it is a *Leucorhynchia* or a *Cirsonella*.

CONCLUSIONS AND COMMENTS

In the present paper, out of 44 species studied, only one could be assigned, with doubts, to a known taxon (*A. rostrata*); one more is presented as sp., due to the fact that it is either a juvenile or has a broken outer lip; the other 42 have been described as being considered new. The lack of knowledge about this group is probably due to the small size of most species and because the area has traditionally been scarcely sampled in a little known Pacific Ocean. Two more taxa, previously known, were placed in other genera and now are considered in the genus *Anticlimax*.

Precisely due to their small size and being collecting in sediments, nothing was known about the soft parts and we present here some data on the external anatomy and on the radula.

The species here studied and described were collected in the following countries:

-Philippines 22 species
-Papua New Guinea 11 species
-Vanuatu 10 species
-New Caledonia 5 species
-Solomon Is. 4 species
-Fiji 2 species.

Due to the scarce material available for most species, information on overall range cannot be considered sufficient. In fact, it is probable that some species have a larger distribution than a single archipelago. There are species with a short protoconch (1 ½ whorls) that are probably endemic to one archipelago, but there are quite a few others with two whorls of protoconch or a little more indicating a planktotrophic period, which probably may live in several archipelagos.

The rarity of the material collected is highlighted when one realizes that only in 4 species the number of shells collected was higher than 10; in 2 cases, the number was between 5-10; on 5 occasions, the shells were 4-5; in 7 cases, they were 3; in 6, only 2; and in 20 cases, only one shell was available. Fortunately, the genus is very rich in morphological details and microsculpture, and so, conclusions could be reached based on so few specimens.

In some few cases a particular species has been collected in more than one country: five species (*A. simulans, A. cyclist, A. dentata, A. philsmithi* and *A. obesa*) were collected in the Philippines and Papua New Guinea; one species (*A. fecunda*) was collected in New Caledonia and Vanuatu; another (*A. tamarae*) was collected in the Solomon Islands and the Philippines; yet another (*A. discus*) in Vanuatu and the Philippines; a further one (*A. juanae*) in New Caledonia and the Philippines; and finally the last (*A. lentiformis*) in Fiji and the Philippines.

The Philippines seems to be the country with more species, presenting the greatest diversification of this group; this is followed by Papua New Guinea with 11 species and Vanuatu with 10.

Regarding the sculpture, there are only two patterns common to all the species: either a smooth surface (sometimes partially), or with spirally aligned circular or oval depressions (Fig. 3A-C); these depressions become confluent when they increase in size (Fig. 3D), fusing together and forming a space between cords that has a zigzag profile.

The studied species are mostly from shallow water. Those collected in very deep water are few:

Between 0 and 10 m, 15 species were collected, but exclusively between these limits only 9 of them; they were 4 in Papua New Guinea, 2 in the Philippines, 2 in Vanuatu and 1 in New Caledonia.

Between 10 and 100 m, 26 species were collected: 15 in the Philippines, 5 in Papua New Guinea, 2 in New Caledonia and 6 in Vanuatu.

Between 100 and 200 m, 9 species in the Philippines.

Between 200 and 300 m, 3 species: 1 in New Caledonia, 1 in Vanuatu and 1 in Fiji.

In more than 300 m, 3 species: 2 in the Solomons and 1 in Vanuatu.

In more than 400 m, 6 species: 4 in the Solomons, 1 in Vanuatu and 1 in Fiji.

Deeper that 600 m, 2 species: 1 in Fiji and 1 in Vanuatu.

There are some inconsistencies in the vertical deep collecting in some species: for example, *A. lentiformis* was collected between 80-100 m in the Philippines while in Fiji it was between 660-663 m. However, with such limited quantities of material, the information may be changed accidentally.

So far, nothing is known about the habitat of species of *Anticlimax*. From all the localities studied, the Philippines is the geographical area with the largest number of described species (22), which are distributed between the infralittoral, circalittoral and bathyal floors. Infralittoral species have been found predominantly on hard ground bottom covered with sand or seagrass; or on soft bottom (fine sand, mud) with seagrass. Circalittoral species have been found in coarse sand, fine muddy sand, mud and fine sand or muddy bottoms with sponges. The bathyal species come from fine sand and mud bottom with echinoderms or mud bottom with shells.

There were two species collected alive: *A. maranii* found in caves in the reef wall; in reef slope or in reef wall with small caves. The study of its radula show its affinity with species of *Nozeba* such as *Nozeba topaziaca* (Hedley), as well as with other species belonging to the genera included in Vitrinellinae as *Cyclostremiscus calameli* (Jousseaume, 1872) or Torninae as *Tornus subcarinatus* (Montagu, 1803). *Anticlimax* cf *cyclist* from SANTO [DSCN1661] could be photographed alive and the animal showed characters of Vitrinellidae (cephalic tentacles finely ciliate; snout distally bilobed; foot expanded anteriorly with small lateral projections.)

The radular pattern and the multispiral operculum with a central nucleus in *Anticlimax maranii* spec. nov. as well as the anatomical characters of *A.* cf *cyclist* confirm the systematic position of *Anticlimax* in Tornidae, subfamily Vitrinellinae, based so far on the morphological characters of the shell.

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The material in this paper is based on the numerous expeditions to the Pacific Ocean conducted by MNHN and IRD over the last 25 years. The deep-sea expeditions are presented by BOUCHET *ET AL.* (2008), and the acknowledgements in their paper are also relevant here. The indefatigable energy of Bertrand Richer de Forges, senior scientist on many of these deep-sea cruises, is specially acknowledged here. The Santo 2006 Global Biodiversity Survey and the Papua Niuguini 2012 expedition were made possible thanks to generous grants from the Total, Stavros Niarchos and Prince Albert II of Monaco Foundations to the MNHN "Our Planet Reviewed" programme. Philippe Maestrati has coordinated the family-level sorting of the material studied here. We also acknowledge the editorial input by Virginie Heros.

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• La revista *Iberus* publica artículos de fondo, notas y monografías que versen sobre cualquiera de los aspectos relacionados con la Malacología. Se entiende por artículo un trabajo de investigación de más de 5 páginas de texto, incluidas láminas, gráficos y tablas. Las notas son trabajos de menor extensión. Las monografías son trabajos sobre un tema único, de extensión superior a las 50 páginas de la revista y que serán publicadas, si procede, como un suplemento de *Iberus*. Los autores interesados en publicar monografías deberán ponerse previamente en contacto con el Editor de Publicaciones. Se entiende que el contenido de los manuscritos no ha sido publicado, ni enviado simultáneamente a otra revista para su consideración.
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• El texto del trabajo podrá estar redactado en español, inglés, italiano, francés o portugués.
• Los artículos, notas y monografías deberán presentarse sobre DIN A-4, por una sola cara a doble espacio (incluyendo referencias, pies de figura y tablas), con al menos 3 centímetros de margen por cada lado. Los trabajos se entregarán por triplicado (original y dos copias) y se incluirá una versión en un CD, o bien remitida por correo electrónico, utilizando procesadores de texto en sus versiones de corrientes de Windows o Macintosh. En caso de autoría compartida, uno de los autores deberá hacerse responsable de toda la correspondencia.
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Páginas siguientes. Incluirán el resto del artículo, que debe dividirse en secciones precedidas por breves encabezamientos. Siempre que sea posible, se recomienda seguir el siguiente esquema: Introducción, Material y métodos, Resultados, Discusión, Conclusiones, Agradecimientos y Bibliografía. Si se emplean abreviaturas no habituales en el texto, deberán indicarse tras el apartado de Material y Métodos.
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Sinonimias
Doris limbata Cuvier, 1804, *Ann. Mus. Hist. Nat. Paris*, 4 (24): 468-469 [Localidad tipo: Marsella].
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Ros J. 1976. Catálogo provisional de los Opistobranquios (Gastropoda: Euthyneura) de las costas ibéricas. *Miscelánea Zoológica*, 3 (5): 21-51.

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Figura 1. *Neodoris carvi*. A: animal desplazándose; B: detalle de un rinóforo; C: branquia.

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Dendrodoris limbata (Cuvier, 1804)
Synonyms
Doris limbata Cuvier, 1804, *Ann. Mus. Hist. Nat. Paris*, 4 (24): 468-469 [Type locality: Marseille].
Doris nigricans Otto, 1823, *Nov. Act. Ac. Caes. Leop.-Car.*, 10: 275.
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Fretter V. and Graham A. 1962. *British Prosobranch Molluscs*. Ray Society, London, 765 pp.
Ponder W.F. 1988. The Truncatelloidean (= Rissoacean) radiation - a preliminary phylogeny. In Ponder W.F. (Ed.): Prosobranch Phylogeny. *Malacological Review*, suppl. 4: 129-166.
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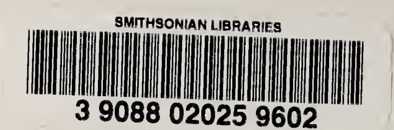
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ÍNDICE

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